

# *Swimming Pool / Spa*



## *Information Packet*

**2012 International Swimming Pool and Spa Code**  
**2011 National Electrical Code**



# The City of West University Place

*A Neighborhood City*

## Swimming Pool/Spa Plan Submittal Checklist

2012 International Swimming Pool and Spa Code, City Code of Ordinances, Chapter 18 & 26, 2011 National Electrical Code

**ADDRESS:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

TO PROCESS YOUR SWIMMING POOL/SPA PLAN REVIEW IN A TIMELY MANNER ALL OF THE FOLLOWING DOCUMENTS AND/OR INFORMATION MUST BE PROVIDED.

NO.	ITEM	YES	NO
1	Building Site Designation Form, signed and notarized – <b>Original Only</b> -		
2	Tree Disposition or Low Impact submitted with plans or copy provided (see below for more information)		
3	Drainage Plans (as-designed), Two (2) sets, signed & sealed [Max size 11' x 17"] <b>Note: As-built drainage plans will also be required prior to occupancy of the pool/spa. See Chapter 18, section 18-56 for more information.</b>		
4	Site Plan Survey (showing all existing & proposed structures, paving, etc.)		
5	Complete pool/spa design plans, two (2) sets and all structural calculations and details for swimming pool permit applications must be prepared and signed by a registered professional engineer.		
6	Eight (8) letters to residents (with small site plan in each envelope) signed, stamped with postage, addressed and envelopes –Not Sealed- for the 3-houses in front, 3-houses behind and 1 on each side Plus a letter for Center Point Energy; Attn: Code Violation Department, 4300 Bissonnet, Bellaire Texas 77401. <b>NOT TO BE MAILED BY CONTRACTOR</b>		
7	Condition of Permit for swimming pool/spa.		
8	Complete building permit application; signed and dated		
9	Electrical Load analysis, include size of main disconnect, current load and pool load		
10	Completed Zoning & Code checklist		

### TREE DISPOSITION INFORMATION BELOW FOR ITEM 2

Sec. 82-3. Tree disposition; surveys.

(a) *General requirement* . Every permit for development or predevelopment activity must contain tree disposition conditions meeting the requirements of this section.

(b) *Essential and mandatory conditions* . Tree disposition conditions are the most important means of protecting the urban forest of the city from unreasonable harm during development and predevelopment activity. Tree disposition conditions shall:

(1) Prohibit removal of or damage to any large tree, except:

a. Removal of a tree which is diseased, severely damaged or dead may be authorized;

b. Damage to or removal of a tree which causes an unreasonable impediment to the use and enjoyment of the applicant's property may be authorized; and

c. Damage to or removal of a low-value tree may be authorized.

(2) Require replacement trees, to the extent provided in the criteria manual, for any large trees authorized to be damaged or removed. Exception: No replacement is required for low-value trees.

(3) Require protection for large trees (and critical root zones). The conditions may specify the methods of protection to be used.

(4) Require that any authorized damage to trees be minimized and mitigated. The conditions may specify methods of mitigation to be used.

(5) Require, if there is major development, that the affected subject site attain a minimum planting standard of tree density as set forth in the criteria manual.

(c) *Procedure* . The building official shall not issue any permit for any development or predevelopment activity unless all of the following have first occurred:

(1) *Tree survey* . The applicant must have filed a tree survey, and the urban forester must have approved it for compliance with this chapter.

(2) *Tree disposition conditions* . Tree disposition conditions approved by the urban forester must have been inserted into the permit. The urban forester may require all persons owning land where a tree is located to agree to any removal of or damage to the tree authorized by the conditions.

(d) *"Low-impact" exception* . Except for the requirement to insert the mandatory conditions, this section does not apply to a subject site, project or other activity that will not have any significant, adverse effect upon any large tree, as determined by the urban forester.

Signature of Permittee

Print Name

Date Submitted

# City of West University Place, Texas ("City")

## OWNER'S DESIGNATION OF A BUILDING SITE AS DEFINED BY THE ZONING ORDINANCE OF THE CITY

STATE OF \_\_\_\_\_ §

COUNTY OF \_\_\_\_\_ §

On \_\_\_\_\_, 20\_\_\_\_, the undersigned person(s) (referred to collectively as "Owner") certifies that the owner owns the Property described below and signs this designation. Words and phrases in this designation have the same meanings as in the Zoning Ordinance.

Property, Street Address(es): \_\_\_\_\_

Property Legal Description(s): \_\_\_\_\_

**Representations By The Owner:** The Owner represents to the City that the Property: (i) is contiguous, (ii) is all owned in fee simple and in common by the Owner, (iii) consists of one or more whole subdivided lots, (iv) includes no common-use areas, (v) includes no area within another building site and (vi) has the minimum dimensions prescribed by the City's Zoning Ordinance. The owner understands that the Zoning Ordinance restricts the division of building sites. The Owner also understands that building sites are regulated in many ways, both by the Zoning Ordinance and by other ordinances of the City.

**Note:** If building site contains one or more partial lots, owner must provide city proof the building site was legally subdivided into present shape before 10/24/1997.

**Designation As One Building Site:** The Owner designates the entire Property described above as a single "building site" under the City's Zoning Ordinance.

Signed : \_\_\_\_\_

Print: \_\_\_\_\_

STATE OF \_\_\_\_\_, COUNTY OF \_\_\_\_\_:

This instrument was acknowledged before me on \_\_\_\_\_, 20\_\_\_\_ by \_\_\_\_\_

(SEAL)

My commission expires: \_\_\_\_\_, Notary Public

Acceptable \_\_\_\_\_, Unacceptable \_\_\_\_\_:

Building Site is unacceptable for the following reason(s):

1. Building site is made-up of one or more partial lots that were not legally subdivided into present shape before 10/24/1987. ( )
2. Proof required lot was legally subdivided into present shape before 10/24/1987. ( )
3. Building site does not meet minimum dimensions as prescribed by Table 5-1 of the Zoning Ordinance. ( )
4. Other (see attached). ( )

Chief Building Official: \_\_\_\_\_ Date: \_\_\_\_\_

**"NOTE: AN ORIGINAL SURVEY DEPICTING THE PROPERTY DESCRIBED ABOVE MUST BE ATTACHED:**



**CITY OF WEST UNIVERSITY PLACE  
DEVELOPMENT SERVICES  
TREE DISPOSITION**

Project Address: \_\_\_\_\_

Contractor Name: \_\_\_\_\_

Phone: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Phone: \_\_\_\_\_

Property Owner: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Phone: \_\_\_\_\_

The following items must be attached:

- ☐ Tree Survey (two (2) copies)  
(include all trees 6" diameter and larger on property and adjacent)
- ☐ Proposed Site Plan (two (2) copies)
- ☐ Narrative/Report on Trees  
(i.e., removals, replacements, irrigation techniques and treatments)

Project: (Please circle one of the following)

New Building - \$250.00

Remodel/Addition - \$150.00

Pool - \$250.00

Garage - \$150.00

Demolition - \$150.00

Housemoving - \$150.00

I hereby certify that I have completed the above information to the best of my ability. I understand that any information submitted in error will result in Tree Disposition Plans and Surveys being returned and an additional re-checking fee being assessed.

Signature \_\_\_\_\_

Date \_\_\_\_\_

Name (print) \_\_\_\_\_

Title \_\_\_\_\_

3826 Amherst • Houston, Texas 77005 • 713-662-5833



The City of West University Place  
*A Neighborhood City*

# Swimming Pool/Spa

## Condition of Permit

I, \_\_\_\_\_, the owner  
Print Name

of \_\_\_\_\_ acknowledge that  
Address

**before any water is placed in the swimming pool/spa** for which a permit is being applied for, all code required enclosure requirements (fencing, gates, latches, any required door alarms and pool/spa equipment stub-outs) will be installed and approved by city of West University Place, via city inspection.

**COMPLIANCE WITH THE CITY TREE DISPOSITION SHALL ALSO BE COMPLETE AND APPROVED BY CITY FORESTER.**

\_\_\_\_\_  
Owner's Signature (same as printed above)      Date: \_\_\_\_\_

\_\_\_\_\_  
Pool /Spa Contractor's Signature      (Same as Permittee on Application)      Date: \_\_\_\_\_

JRB 1-2-13

**SAMPLE LETTER ONLY**  
CONTRACTOR'S COMPANY LETTERHEAD

DATE

\_\_\_\_\_  
(To immediately adjacent houses)

\_\_\_\_\_  
Address

\_\_\_\_\_  
City, State, Zip

Dear Resident:

Soon (construction of a new residence), ( major remodeling of residence), will begin at the above address. We realize that the construction may cause temporary inconveniences to those living nearby, however we intend to minimize this disruption by taking necessary precautions to protect your property as well as property in the surrounding neighborhood.

The City of West University Place has been impacted by the tremendous growth in new construction, and the city officials are extremely concerned about resolving any problems, inconveniences, and/or annoyances that may result. The purpose of this letter is to inform you of certain ordinances that deals directly with situations that commonly occur in construction:

1. **LOUD AND EXCESSIVE CONSTRUCTION NOISE:** Occurring before 7am and after 8pm Monday - Friday, before 8am and after 8pm on Saturday, and before 12:00 noon and after 8pm on Sunday, **New Year's Day, Thanksgiving Day, Christmas Day, and whenever New Year's Day or Christmas Day falls on a Saturday or Sunday the corresponding Friday or Monday on which the City observes that holiday is prohibited.**
2. **PORTABLE SANITARY FACILITIES:** Should not be placed on the easement or sidewalk, but positioned within boundaries of the property line.
3. **LOCATION OF CONSTRUCTION MATERIAL (lumber, bricks, etc.):** Stacked and stored on the sidewalk or in the street is prohibited.
4. **LITTER TRASH CONTAINERS FOR LOOSE TRASH:** Required; making it unlawful to deposit trash and debris within the city in such a manner that it may be carried or deposited by the elements upon the street, easement, street of right-of-way, vacant lot, or any occupied/unoccupied premises.
5. **TRESPASSING:** Any person found on a homeowner's property are in violation of Criminal Trespass Statute, and may anticipate

arrest.

6. **FENCE DAMAGE:** Civil matter between the contractor and homeowner's.
7. **CURB, GUTTER, & SIDEWALK:** Unlawful to injure, deface, or destroy any real or personal property belonging to the city. The contractor is responsible for repairing any damages.
8. **WATER:** No person shall take water from public or private hydrant unless permission has been granted.
9. **PARKING:** No person shall stop or park any vehicle upon a street clearly marked prohibiting parking, nor leave available less than ten feet of the width of either lane or roadway.
10. **SERVICE TRUCKS:** All service oriented trucks and vehicles shall display the name, address, and phone number of their business on the side of the vehicle.
11. **TREES:** All "Protected Trees", as defined in Chapter 22, must be fenced or otherwise protected prior to demolition of the existing residence to prevent damage to tree roots. Storage of materials, trash containers, or portable sanitary facilities within protective fencing is prohibited. Existing sidewalks and driveways shall remain in place as long as possible to minimize damage to tree roots from vehicles.

The city requires us to notify you of existing city ordinances and state laws, which will be enforced. Should you however experience any type of inconvenience, annoyance, or problems please contact (the name of person with the company & telephone), and he/she will certainly do everything within his/her power to correct the matter.

---

(Signature of contractor or builder)

Type name and title:

Type name of company:

**SAMPLE LETTER ONLY**



The City of West University Place  
A Neighborhood City

Building Permit Application

3826 Amherst Street, West University Place, Texas 77005 (713) 662-5833 Fax (713) 662-5304  
Inspection request line (713) 662-5805 Available 24/7 [before 7:45 AM for same day]

Project Address: \_\_\_\_\_ Application #: \_\_\_\_\_

Project Name: \_\_\_\_\_ Approved Plat: ☐ Yes ☐ No Zoning District: \_\_\_\_\_

Flood Zone: \_\_\_\_\_ Subdivision: \_\_\_\_\_ Lot : \_\_\_\_\_ Block: \_\_\_\_\_

Property Owner: \_\_\_\_\_ Address: \_\_\_\_\_ City: \_\_\_\_\_

State/Zip: \_\_\_\_\_ Phone: ( ) - - - - - Fax: ( ) - - - - -

Occupancy Type: ☐ Residential ☐ Commercial ☐ Industrial

Class of Work: ☐ New ☐ Remodel ☐ Demolition ☐ Build-out Square footage of Improvements: \_\_\_\_\_

**Renovation/Demolition As required for Public or Commercial buildings by Senate Bill 509 (Effective January 1, 2002)**

Was an asbestos survey performed in accordance with Texas Asbestos Health Protection Rules (TAHPR) and the National Emission Standards for Hazardous Air Pollutants (NESHAP)? ☐ Yes ☐ No\* Date of Survey: \_\_\_\_/\_\_\_\_/\_\_\_\_ TDH Inspector License No. \_\_\_\_\_ Copy Attached ☐ Yes ☐ No

\* If the answer is No, then as the owner/operator of the renovation/demolition site, I understand that it is my responsibility to have this asbestos survey conducted in accordance with Texas Asbestos Health Protection Rules (TAHPR) and National Emission Standards for Hazardous Air Pollutants (NESHAP) prior to a renovation/demolition permit being issued by the City of West University Place. **Signed:** \_\_\_\_\_

Residential: # of Stories ☐ 1 ☐ 2 ☐ 2.5 ☐ Basement; # of Bedrooms ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ \_\_\_\_\_; # of Baths \_\_\_\_\_

Building Height: \_\_\_\_\_ Building Site Sq. Ft.: \_\_\_\_\_ Framed Area Sq. Ft. \_\_\_\_\_

Garage: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ Attached ☐ Detached Exterior: ☐ Brick, ☐ Stone, ☐ Stucco, ☐ Other \_\_\_\_\_

Description of Work: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Contractor (Company Name): \_\_\_\_\_

West University Contractor Registration No. \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ State/Zip: \_\_\_\_\_

Phone #: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ Fax#: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ Cell #: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Contact Person: \_\_\_\_\_ E-mail: \_\_\_\_\_

(PLEASE PRINT)

Valuation of the Project \$ \_\_\_\_\_

Signature of Permittee: \_\_\_\_\_ Date: \_\_\_\_\_

**OFFICIAL USE ONLY**

Received By: \_\_\_\_\_ Time/Date Stamp: \_\_\_\_\_

Plan Checking Fee: \_\_\_\_\_ Building Permit Fee: \_\_\_\_\_ TOTAL FEES: \_\_\_\_\_

No Exceptions Taken: \_\_\_\_\_ Date: \_\_\_\_\_

05-12-09 JRB



## BUILDING PERMIT APPLICATION

Page 2 of 2

### TREE DISPOSITION

(a separate permit is required)

Chapter 82 Sec. 82-3

**A complete copy of Chapter 82 is available in the Permit Office**

(c) *Procedure* . The building official shall not issue any permit for any development or predevelopment activity unless all of the following have first occurred:

(1) *Tree survey* . The applicant must have filed a tree survey, and the urban forester must have approved it for compliance with this chapter.

(2) *Tree disposition conditions* . Tree disposition conditions approved by the urban forester must have been inserted into the permit. The urban forester may require all persons owning land where a tree is located to agree to any removal of or damage to the tree authorized by the conditions.

(d) *"Low-impact" exception* . Except for the requirement to insert the mandatory conditions, this section does not apply to a subject site, project or other activity that will not have any significant, adverse effect upon any large tree, as determined by the urban forester.

I hereby certify I have read and examined this document and know the same to be true and correct. All provisions of law and ordinances governing this type of work will be complied with whether specified herein or not. I further understand that plans submitted for approval will be subjected to a comprehensive check against municipal ordinance and building code. Any set of plans that must be returned for modifications or corrections in order to come into compliance with ordinance or code will be subject to rechecking in order of submittal. Under no circumstances will paid fees be refunded or transferred. Applications and plans will be held for 180 days. After 180 days this application and plans will be disposed of unless a valid building permit is issued. SEPA/EATE PERMIT REQUIRED: Fence, Pool/Spa, Flatwork, Irrigation, Drainage (below grade), pavers, MEP's.

\_\_\_\_\_  
Signature of Permittee

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Date

### FOR OFFICE STAFF USE ONLY

#### RESIDENTIAL PERMIT FEE SCHEDULE (COMMERCIAL \$0.48 PER SQ.FT.)

(A) TOTAL FRAMED AREA SQ. FT. \_\_\_\_\_ x \$0.40 = BUILDING PERMIT FEE \$ \_\_\_\_\_

(B) PLAN REVIEW FEE= 50% OF THE BUILDING PERMIT FEE: \$ \_\_\_\_\_  
(Minimum plan review fee is \$25.00)

#### **TOTAL PERMIT FEE:**

BUILDING PERMIT FEE + PLAN REVIEW FEE + APPLICATION FEE \$30.00 = \$ \_\_\_\_\_

Plans denied and returned for correction: Date \_\_\_\_\_ By \_\_\_\_\_

Second Review Denied: Date: \_\_\_\_\_ By \_\_\_\_\_

Reason for return: \_\_\_\_\_

No exceptions taken: Date \_\_\_\_\_ By \_\_\_\_\_

Commercial: Fire Sprinkled ☐ Yes ☐ No Occupancy Group \_\_\_\_\_ No. of Stories \_\_\_\_\_

Construction Type \_\_\_\_\_ No. of Off-street spaces \_\_\_\_\_ Occupant Load \_\_\_\_\_

Total Paved Area \_\_\_\_\_ Sq. Ft.

Onsite Detention ☐ yes ☐ No

Rev. 1-2-13 JRB

# Swimming Pool/Spa Zoning-Code Checklist

2012 ISPC & 2011 NEC

Address: \_\_\_\_\_ Date: \_\_\_\_\_

Zoning District: \_\_\_\_\_ Flood Zone: \_\_\_\_\_

**CONDITION OF PERMIT:** Signed original is accompanying application Yes\_\_\_No\_\_\_

**Zoning Requirements:**

- A. Distance from side property line = Five (5) feet minimum Yes\_\_\_No\_\_\_
- B. Distance from rear property line = Five (5) feet minimum Yes\_\_\_No\_\_\_
- C. No encroachment in or on a utility/easement shown Correct\_\_\_\_\_
- D. Pool equipment in compliance with Table 7-6 Note 6  
(Noise 70 decibels and 3' min. from side property line) Yes\_\_\_No\_\_\_
- E. Pervious area 24% entire site  
(Only water area of pool/spa is considered pervious) Yes\_\_\_No\_\_\_
- F. 70% of perimeter of pool/spa shall have 3' wide walkway Yes\_\_\_No\_\_\_
- G. Building site designation Yes\_\_\_No\_\_\_

\*\*\*\*\*

**Code Requirements:**

1. Provide route for gas piping from meter to pool heater. \_\_\_\_\_ Yes\_\_\_No\_\_\_  
(Install a 2-stage gas meter Yes\_\_\_No\_\_\_ or provide a complete gas riser diagram longest length,  
per IFGC table 402.4(2) signed by Master Plumber including the Master license number)  
[Gas pipe shall be sleeved under concrete] Anodeless Risers are required.
2. Provide electrical route from main disconnect to equipment \_\_\_\_\_ Yes\_\_\_No\_\_\_
3. Provide electrical load analysis \_\_\_\_\_ Yes\_\_\_No\_\_\_  
(Existing load and with new pool/spa load, size of main disconnect, this shall be  
signed by Master Electrician including his master license number)
4. Provide pool/spa reinforcement, wall and beam detail \_\_\_\_\_ Yes\_\_\_No\_\_\_  
(Must bear Engineer's wet seal and signature)
5. Pool/spa enclosure/barrier shall comply with Section 305, \_\_\_\_\_ Yes\_\_\_No\_\_\_  
(See Section 305, fences, door & window alarms and locally all gates shall be 6 feet high)
6. Backwash/overflow shall drain to Storm sewer (not Sanitary Sewer) \_\_\_\_\_ Yes\_\_\_No\_\_\_
7. Provide vertical and horizontal clearances from power lines, \_\_\_\_\_ Yes\_\_\_No\_\_\_  
(per 2011NEC figure 680.8)
8. Provide site plan showing location of pool/spa equipment \_\_\_\_\_ Yes\_\_\_No\_\_\_
9. Provided with the application, an on-ground staked survey, by a registered professional engineer or  
licensed surveyor locating the lot corners, all property lines, all utility and other easements and the  
pool location on the lot at time of application for permit. Note: An "as-built" survey will be  
required by the Chief Building Official. \_\_\_\_\_ Yes\_\_\_No\_\_\_
10. Suction Entrapment Avoidance per Section 310 \_\_\_\_\_ Yes\_\_\_No\_\_\_
11. Provide horizontal distance from existing foundations to outside wall of pool Yes\_\_\_No\_\_\_  
(if less than the depth of the pool have the engineer provide design letter as not to affect the  
existing structural foundation)
12. For more information see Code of Ordinance Article VI, section 18-169 & table 7-6, projections.

## CHAPTER 3

# GENERAL COMPLIANCE

### SECTION 301 GENERAL

**301.1 Scope.** The provisions of this chapter shall govern the general design and construction of public and *residential aquatic vessels* and all related piping, equipment, and materials. Provisions that are unique to a specific type of *aquatic vessel* are located in Chapters 4 through 10.

**301.1.1 Application of Chapters 4 through 10.** Where differences occur between the provisions of this chapter and the provisions of Chapters 4 through 10, the provisions of Chapter 4 through 10 shall apply.

### SECTION 302 ELECTRICAL, PLUMBING, MECHANICAL AND FUEL GAS REQUIREMENTS

**302.1 Electrical.** Electrical requirements for aquatic facilities shall be in accordance with NFPA 70 or the *International Residential Code*, as applicable in accordance with Section 102.7.1.

**Exception:** Internal wiring for *portable residential spas* and *portable residential exercise spas*.

**302.2 Water service and drainage.** Piping and fittings used for water service, makeup and drainage piping for *aquatic vessels* shall comply with the *International Plumbing Code*. Fittings shall be approved for installation with the piping installed.

**302.3 Pipe, fittings and components.** Pipe, fittings and components shall be *listed* and *labeled* in accordance with NSF 50 or NSF 14. Plastic jets, fittings, and outlets used in public *spas* shall be *listed* and *labeled* in accordance with NSF 50.

**Exception:** *Portable residential spas* and *portable residential exercise spas* *listed* and *labeled* in accordance with UL 1563 or CSA C22.2 No. 218.1.

**302.4 Concealed piping inspection.** Piping, including process piping, that is installed in trenches, shall be inspected prior to backfilling.

**302.5 Backflow protection.** Water supplies for *aquatic vessels* shall be protected against backflow in accordance with the *International Plumbing Code* or the *International Residential Code*, as applicable in accordance with Section 102.7.1.

**302.6 Wastewater discharge.** Where wastewater from *aquatic vessels*, backwash from *filters* and water from deck drains discharge to the building drainage system, such installation shall be in accordance with the *International Plumbing Code* or the *International Residential Code*, as applicable in accordance with Section 102.7.1.

**302.7 Tests.** Tests on piping systems constructed of plastic piping shall not use compressed air for the test.

**302.8 Maintenance.** *Aquatic vessels* shall be maintained in a clean and sanitary condition, and in good repair.

**302.8.1 Manuals.** An operating and maintenance manual in accordance with industry-accepted standards shall be provided for each piece of equipment requiring maintenance.

### SECTION 303 ENERGY

**303.1 General.** The energy requirements for pools and inground permanently installed *spas* shall be as specified in Sections 303.2 through 303.4 and APSP 15. The energy requirements for *residential* portable electric *spas* shall be in accordance with APSP 14.

**303.2 Heaters.** Heaters shall be equipped with an external on-off switch to allow the heater to be shutoff without adjusting the thermostat setting. Such switch shall be provided with ready access. Gas-fired heaters shall not be equipped with continuous pilot burners.

**Exception:** *Portable residential spas* and *portable residential exercise spas*.

**303.3 Time switches.** Time switches or other control methods that can automatically turn off and on heaters and pumps according to a preset schedule shall be installed with or on all heaters and pumps. Heaters, pumps and motors that have built-in timers shall be deemed in compliance with this requirement.

#### Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate waste-heat recovery pool heating systems.
3. *Portable residential spas* and *portable residential exercise spas*.

**303.4 Covers.** Heated pools and inground permanently installed *spas* shall be provided with a vapor retardant *cover*.

**Exception:** Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source.

### SECTION 304 FLOOD HAZARD AREAS

**304.1 General.** The provisions of Section 304 shall control the design and construction of *aquatic vessels* installed in flood hazard areas.

**304.2 Determination of impacts based on location.** *Aquatic vessels* located in flood hazard areas indicated within the

*International Building Code* or the *International Residential Code* shall comply with Section 304.2.1 or 304.2.2.

**Exception:** *Aquatic vessels* located in riverine flood hazard areas that are outside of designated floodways and *aquatic vessels* located in flood hazard areas where the source of flooding is tides, storm surges or coastal storms.

**304.2.1 Aquatic vessels located in designated floodways.** Where *aquatic vessels* are located in designated floodways, documentation shall be submitted to the *code official* that demonstrates that the construction of the aquatic vessel will not increase the design flood elevation at any point within the jurisdiction.

**304.2.2 Aquatic vessels located where floodways have not been designated.** Where *aquatic vessels* are located where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed *aquatic vessel* and any associated grading and filling, will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction.

**304.3 Aquatic vessels in flood hazard areas subject to high-velocity wave action.** *Aquatic vessels* installed in flood hazard areas subject to high-velocity wave action (coastal high hazard areas) shall be designed and constructed in accordance with ASCE 24.

**304.4 Protection of equipment.** Equipment shall be elevated to or above the design flood elevation or be anchored to prevent flotation and protected to prevent water from entering or accumulating within the components during conditions of flooding.

**304.5 GFCI protection.** Electrical equipment installed below the design flood elevation shall be supplied by branch circuits that have ground-fault circuit interrupter protection for personnel.

## SECTION 305 BARRIER REQUIREMENTS

**305.1 General.** The provisions of this section shall apply to the design of *barriers* for *aquatic vessels*. These design controls are intended to provide protection against the potential drowning and near drowning by restricting access to such vessels. These requirements provide an integrated level of protection against potential drowning through the use of physical barriers and warning devices.

### Exceptions:

1. *Spas* and hot tubs with a lockable safety cover that complies with ASTM F 1346.
2. Swimming pools with a *powered safety cover* that complies with ASTM F 1346.

**305.2 Outdoor swimming pools and spas.** All outdoor *aquatic vessels* and indoor swimming pools shall be surrounded by a *barrier* that complies with Sections 305.2.1 through 305.7.

**305.2.1 Barrier height and clearances.** Barrier heights and clearances shall be in accordance with all of the following:

1. The top of the *barrier* shall be not less than 48 inches (1219 mm) above grade where measured on the side of the *barrier* that faces away from the *aquatic vessel*. Such height shall exist around the entire perimeter of the vessel and for a distance of 3 feet (914 mm) where measured horizontally from the required *barrier*.
2. The vertical clearance between grade and the bottom of the *barrier* shall not exceed 2 inches (51 mm) for grade surfaces that are not solid, such as grass or gravel, where measured on the side of the barrier that faces away from the vessel.
3. The vertical clearance between a surface below the barrier to a solid surface, such as concrete, and the bottom of the required *barrier* shall not exceed 4 inches (102 mm) where measured on the side of the required barrier that faces away from the vessel.
4. Where the top of the vessel structure is above grade, the *barrier* shall be installed on grade or shall be mounted on top of the vessel structure. Where the *barrier* is mounted on the top of the vessel, the vertical clearance between the top of the vessel and the bottom of the *barrier* shall not exceed 4 inches (102 mm).

**305.2.2 Openings.** Openings in the *barrier* shall not allow passage of a 4 inch (102 mm) diameter sphere.

**305.2.3 Solid barrier surfaces.** Solid *barriers* that do not have openings shall not contain indentations or protrusions that form handholds and footholds, except for normal construction tolerances and tooled masonry joints.

**305.2.4 Mesh restraining barrier/fence.** Mesh fences, other than chain link fences in accordance with Section 305.2.7, shall be installed in accordance with the manufacturer's instructions and shall comply with the following:

1. The bottom of the mesh restraining fence shall be not more than 1 inch (25 mm) above the deck or installed surface or grade.
2. The maximum vertical clearance from the bottom of the mesh fence and the solid surface shall not permit the fence to be lifted more than 4 inches (102 mm) from grade or decking.
3. The fence shall be designed and constructed so that it does not allow passage of a 4-inch (102 mm) sphere under any mesh panel. The maximum vertical clearance from the bottom of the mesh fence and the solid surface shall not be more than 4 inches (102 mm) from grade or decking.
4. An attachment device shall attach each barrier section at a height not lower than 45 inches (1143 mm) above grade. Common attachment devices include, but are not limited to, devices that provide the secu-

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urity equal to or greater than that of a hook-and-eye-type latch incorporating a spring-actuated retaining lever such as a safety gate hook.

5. Where a hinged gate is used with a mesh *barrier*, the gate shall comply with Section 305.3.
6. Patio deck sleeves such as vertical post receptacles which are placed inside the patio surface shall be of a nonconductive material.
7. Mesh fences shall not be used on top of on ground *residential pools*.

**305.2.5 Closely spaced horizontal members.** Where the *barrier* is composed of horizontal and vertical members and the distance between the tops of the horizontal members is less than 45 inches (1143 mm), the horizontal members shall be located on the *aquatic vessel* side of the fence. Spacing between vertical members shall not exceed 1.75 inches (44 mm) in width. Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1.75 inches (44 mm) in width.

**305.2.6 Widely spaced horizontal members.** Where the *barrier* is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 inches (1143 mm) or more, spacing between vertical members shall not exceed 4 inches (102 mm). Where there are decorative cutouts within vertical members, spacing within the cutouts shall not exceed 1.75 inches (44 mm) in width.

**305.2.7 Chain link dimensions.** The maximum opening formed by a chain link fence shall be not more than 1.75 inches (44 mm). Where the fence is provided with slats fastened at the top and bottom which reduces the openings, such openings shall be not more than 1.75 inches (44 mm).

**305.2.8 Diagonal members.** Where the *barrier* is composed of diagonal members, the maximum opening formed by the diagonal members shall be not more than 1.75 inches (44 mm). The angle of diagonal members shall not be greater than 45 degrees (0.79 rad) from vertical.

**305.2.9 Clear zone.** There shall be a clear zone of not less than 36 inches (914 mm) around the *exterior of the barrier* and around any permanent structures or equipment such as pumps, *filters* and heaters that can be used to climb the barrier.

**305.2.10 Poolside barrier setbacks.** The *aquatic vessel* side of the required *barrier* shall be not less than 20 inches (508 mm) from the water's edge.

**305.3 Gates.** Access gates shall comply with the requirements of Sections 305.3.1 through 305.3.3 and shall be equipped to accommodate a locking device. Pedestrian access gates shall open outward away from the vessel and shall be self-closing and have a self-latching device.

**305.3.1 Utility or service gates.** Gates not intended for pedestrian use, such as utility or service gates, shall remain locked when not in use.

**305.3.2 Double or multiple gates.** Double gates or multiple gates shall have at least one leaf secured in place and

the adjacent leaf shall be secured with a self-latching device. The gate and *barrier* shall not have openings larger than  $\frac{1}{2}$  inch (12.7 mm) within 18 inches (457 mm) of the latch release mechanism. The self-latching device shall comply with the requirements of Section 305.3.3.

**305.3.3 Latches.** Where the release mechanism of the self-latching device is located less than 54 inches (1372 mm) from grade, the release mechanism shall be located on the vessel side of the gate at least 3 inches (76 mm) below the top of the gate, and the gate and *barrier* shall not have openings greater than  $\frac{1}{2}$  inch (12.7 mm) within 18 inches (457 mm) of the release mechanism.

**305.4 Structure wall as a barrier.** Where a wall of a dwelling or structure serves as part of the *barrier*, doors and operable windows with a sill height of less than 48 inches (1219 mm) that provide direct access to the *aquatic vessel* through the wall, shall be equipped with one or more of the following:

1. An alarm that produces an audible warning when the door or its screen or window, is opened. The alarm shall be *listed and labeled* as a water hazard entrance alarm in accordance with UL 2017. In dwellings or structures not required to be Accessible units, Type A units or Type B units, the deactivation switch shall be located 54 inches (1372 mm) or more above the threshold of the door. In dwellings or structures required to be Accessible units, Type A units or Type B units, the deactivation switch shall be located not greater than 54 inches (1372 mm) and not less than 48 inches (1219 mm) above the threshold of the door.
2. A safety cover that is *listed and labeled* in accordance with ASTM F 1346.
3. An *approved* means of protection, such as self-closing doors with self-latching devices, provided that the degree of protection afforded is not less than the protection afforded by Items 1 or 2.

**305.5 Pool structure as a barrier.** Where an onground *residential pool* structure is used as a *barrier* or where the *barrier* is mounted on top of the pool structure, the following shall apply:

1. An onground pool wall, itself, shall be permitted to be the *barrier* where the pool structure is on grade and the wall is at least 48 inches (1219 mm) above grade for the entire perimeter of the pool and complies with the requirements of Section 305.2.
2. Where the means of access is a *ladder* or steps, the *ladder* or steps shall be capable of being secured, locked or removed to prevent access or the ladder or steps shall be surrounded by a *barrier* that meets the requirements of this section.
3. When the *ladder* or steps are secured, locked or removed, any opening created shall not allow the passage of a 4 inch (102 mm) diameter sphere.
4. The *barrier* shall be installed in accordance with the manufacturer's instructions.

**305.6 Natural barriers.** In the case where the vessel area abuts the edge of a lake or other natural body of water, public

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access is not permitted or allowed along the shoreline, and required *barriers* extend to and beyond the water's edge a minimum of 18 inches (457 mm), a *barrier* is not required between the natural body of water shoreline and the vessel.

**305.7 Natural topography.** Natural topography that prevents direct access to the *aquatic vessel* area shall include but not be limited to mountains and natural rock formations. A natural *barrier approved* by the governing body shall be acceptable provided that the degree of protection is not less than the protection afforded by the requirements of Sections 305.2 through 305.5.

### SECTION 306 DECKS

**306.1 General.** Decks shall be designed and installed in accordance with the *International Residential Code* or the *International Building Code*, as applicable in accordance with Section 102.7, except as provided in this section.

**306.2 Slip resistant.** Decks, ramps, coping, and similar step surfaces shall be *slip-resistant* and cleanable. Special features in or on decks such as markers, brand insignias, and similar materials shall be *slip-resistant*.

**306.3 Stair treads and risers.** Stair riser heights shall be in accordance with the *International Residential Code* or the *International Building Code*, as applicable in accordance with Section 102.7.1.

**306.4 Slope.** The minimum slope of decks shall be in accordance with Table 306.4 except where an alternative drainage method is provided that prevents the accumulation or pooling of water. The slope for decks, other than wood decks, shall be not greater than  $\frac{1}{2}$  inch per foot (1 mm per 24 mm) except for ramps. The slope for wood and wood/plastic composite decks shall be not greater than  $\frac{1}{4}$  inch per 1 foot (1 mm per 48 mm). Decks shall be sloped so that standing water will not be deeper than  $\frac{1}{8}$  inch (3.2 mm), 20 minutes after the cessation of the addition of water to the deck.

**306.5 Gaps.** Gaps shall be provided between deck boards in wood and wood/plastic composite decks. Gaps shall be consistent with *approved* engineering methods with respect to the type of wood used and shall not cause a tripping hazard.

**306.5.1 Maximum gap.** The open gap between pool decks and adjoining decks or walkways, including joint material, shall be not greater than  $\frac{3}{4}$  inch (19.1 mm). The difference

in vertical elevation between the pool deck and the adjoining sidewalk shall be not greater than  $\frac{1}{4}$  inch (6.4 mm).

**306.6 Concrete joints.** Isolation joints that occur where the pool coping meets the concrete deck shall be watertight.

**306.6.1 Joints at coping.** Joints that occur where the pool coping meets the concrete deck shall be installed to protect the coping and its mortar bed from damage as a result of the anticipated movement of adjoining deck.

**306.6.2 Crack control.** Joints in a deck shall be provided to minimize visible cracks outside of the control joints caused by imposed stresses or movement of the slab.

**306.6.3 Movement control.** Areas where decks join existing concrete work shall be provided with a joint to protect the pool from damage due to relative movement.

**306.7 Deck edges.** The edges of all decks shall be radiused, tapered, or otherwise designed to eliminate sharp corners.

**306.8 Valves under decks.** Valves installed in or under any deck shall be provided with access for operation, service, and maintenance as required by the *International Plumbing Code* or *International Residential Code*, as applicable in accordance with Section 102.7.1. Access covers shall be provided.

**306.8.1 Hose bibbs.** Hose bibbs shall be provided for rinsing down the entire deck and shall be installed in accordance with the *International Plumbing Code* or *International Residential Code*, as applicable in accordance with Section 102.7.1, and shall be located not more than 150 feet (45 720 mm) apart. Water-powered devices, such as water-powered lifts, shall have a dedicated hose bibb water source.

**Exception:** *Residential pools* and spas shall not be required to have hose bibbs located at 150-foot (45 720 mm) intervals, or have a dedicated hose bibb for water-powered devices.

### SECTION 307 GENERAL DESIGN

**307.1 General.** The provisions of this section apply to all *aquatic vessels*.

**Exception:** The provisions of Sections 307.3 through 307.6 do not apply to *listed and labeled portable residential spas* and *listed and labeled portable residential exercise spas*.

TABLE 306.4  
MINIMUM DRAINAGE SLOPES

SURFACE	TYPICAL MINIMUM DRAINAGE SLOPE (INCH PER FOOT)
Brick and heavy textured finish	$\frac{3}{8}$ inch
Carpet	$\frac{1}{2}$ inch
Exposed aggregate	$\frac{1}{4}$ inch
Textured, hand-finished concrete	$\frac{1}{8}$ inch
Wood	$\frac{1}{8}$ inch
Wood/plastic composite	$\frac{1}{8}$ inch

For SI: 1 inch per foot = 83.3 mm per m.

**307.2 Glazing in hazardous locations.** Glazing in hazardous locations for *residential pools* and spas shall comply with the *International Residential Code*. Glazing in hazardous locations in all other occupancies shall comply with the *International Building Code*.

**307.3 Materials.** *Aquatic vessels* and appurtenances thereto shall be constructed of materials that are nontoxic to humans and the environment; that are generally or commonly regarded to be impervious and enduring; that will withstand the design stresses; and that will provide a watertight structure with a smooth and easily cleanable surface without cracks or joints, excluding structural joints, or that will provide a watertight structure to which a smooth, easily cleaned surface/finish is applied or attached. Material surfaces that come in contact with the user shall be finished, so that they do not constitute a cutting, pinching, puncturing or abrasion hazard under casual contact and intended use.

**307.3.1 Beach pools.** Clean sand or similar material, where used in a beach pool environment, shall be used over an impervious surface. The sand area shall be designed and controlled so that the *circulation system*, maintenance, safety, sanitation, and operation of the pool are not adversely affected.

**307.3.2 Compatibility.** Assemblies of different materials shall be chemically and mechanically compatible for their intended use and environment.

**307.4 Structural design.** The structural design of *aquatic vessels* shall be in accordance with the *International Building Code* or *International Residential Code*, as applicable in accordance with Section 102.7.1.

**307.4.1 Installation.** Equipment for *aquatic vessels* shall be supported to prevent damage from misalignment and settling and located so as to allow access for inspection, servicing, removal and *repair* of component parts.

**307.5 Freeze protection.** In climates subject to freezing temperatures, outdoor *aquatic vessel* shells and appurtenances, piping, filter systems, pumps and motors, and other components shall be designed and constructed to provide protection from damage from freezing.

**307.6 Surface condition.** The surfaces within public *aquatic vessels* intended to provide footing for users shall be slip resistant and shall not cause injury during normal use.

**307.7 Colors and finishes.** The colors, patterns, or finishes of the vessel interior shall not obscure objects or surfaces within the vessel.

**Exception:** *Residential pools and spas*.

**307.8 Roofs or canopies.** Roofs or canopies over *aquatic vessels* shall be in accordance with the *International Building Code* or *International Residential Code*, as applicable in accordance with Section 102.7.1 and shall be constructed so as to prevent water runoff into the *aquatic vessel*.

**307.9 Accessibility.** An accessible route to the public *aquatic vessel* shall be provided in accordance with the *International Building Code*. Accessibility within the public *aquatic vessel* shall be provided as required by the accessible recreational

facilities provisions of the *International Building Code*. Accessibility for *aquatic vessels* accessory to detached one- and two-family dwellings and townhouses not more than three stories in height shall be provided where required by the *International Residential Code*.

## SECTION 308 DIMENSIONAL DESIGN

**308.1 Floor slope.** The slope of the floor from the point of the first slope change to the deep area shall not exceed one unit vertical in three units horizontal.

**Exception:** *Portable residential spas and portable residential exercise spas*.

**308.2 Walls.** Walls shall intersect with the floor at an angle or a transition profile. Where a transitional profile is provided at water depths of 3 feet (914 mm) or less, a transitional radius shall not exceed 6 inches (150 mm) and shall be tangent to the wall and is permitted to be tangent to or intersect the floor.

**Exceptions:**

1. *Portable residential spas and portable residential exercise spas*.
2. *Onground storable pools*.

**308.3 Shape.** This code is not intended to regulate the shape of *aquatic vessels* other than to take into account the effect that a given shape will have on the safety of the occupants and to maintain the minimum required level of circulation to ensure sanitation.

**308.4 Waterline.** The design waterline shall have a maximum construction tolerance at the time of completion of the work of plus or minus  $\frac{1}{4}$  inch (6.35 mm) for *aquatic vessels* with adjustable weir surface skimming systems, and plus or minus  $\frac{1}{8}$  inch (3.175 mm) for aquatic vessels with nonadjustable surface skimming systems.

## SECTION 309 EQUIPMENT

**309.1 General.** Electrically operated equipment shall be listed and labeled in accordance with applicable product standards. Treatment and *circulation system* equipment for public *aquatic vessels* shall be listed and labeled in accordance with NSF 50 and other applicable standards.

**Exception:** *Portable residential spas and portable residential exercise spas* listed and labeled in accordance with UL 1563 or CSA C22.2 No. 218.1.

## SECTION 310 SUCTION ENTRAPMENT AVOIDANCE

**310.1 General.** Suction entrapment avoidance for aquatic vessels shall be provided in accordance with APSP 7.

**Exception:** *Portable residential spas and portable residential exercise spas* listed and labeled in accordance with UL 1563 or CSA C22.2 No. 218.1.

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### SECTION 311 CIRCULATION SYSTEMS

**311.1 General.** The provisions of this section apply to *circulation systems* for aquatic vessels.

**Exception:** *Portable residential spas and portable residential exercise spas.*

**311.2 System design.** A *circulation system* consisting of pumps, piping, *return inlets* and outlets, *filters*, and other necessary equipment shall be provided for the complete circulation of water. Wading pools and spas shall have separate dedicated filtering systems.

**Exception:** Separate filtering systems are not required for *residential aquatic vessels*.

**311.2.1 Turnover rate.** The equipment shall be sized to turn over the volume of water that the *aquatic vessel* is capable of containing as specified in this code for the specific installation.

**311.2.2 Servicing.** *Circulation system* components that require replacement or servicing shall be provided with access for inspection, *repair*, or replacement and shall be installed in accordance with the manufacturer's specifications.

**311.2.3 Equipment anchorage.** *Aquatic vessel* equipment and related piping shall be designed and installed in accordance with the manufacturer's installation instructions.

**311.3 Water velocity.** The *water velocity* in return lines shall not exceed 8 feet (2.4 m) per second. The water velocity in suction piping shall be as required by Section 310.

**311.4 Piping and fittings.** Plastic pipe and fittings used in *circulation systems* shall be nontoxic and shall be able to withstand the design operating pressures and conditions of the *aquatic vessel*. Plastic pipe shall be *listed* and *labeled* as

complying with NSF 14. *Circulation system* piping shall be *listed* and *labeled* as complying with one of the standards in Table 311.4.

**311.4.1 Fittings.** Fittings used in *circulation systems* shall be *listed* and *labeled* as complying with one of the standards in Table 311.4.1.

#### Exceptions:

1. *Suction outlet fitting* assemblies and manufacturer-provided components certified in accordance with APSP 16.
2. *Skimmers* and manufacturer-provided components.
3. *Gutter* overflow grates and fittings installed above or outside of the overflow point of the pool or *spa*.

**311.4.2 Joints.** Joints shall be made in accordance with manufacturer's instructions.

**311.4.3 Piping subject to freezing.** Piping subject to damage by freezing shall have a uniform slope in one direction and shall be equipped with valves for drainage or shall be capable of being evacuated to remove the water.

**311.5 System draining.** Equipment shall be designed and fabricated to drain the water from the equipment, together with exposed face piping, by removal of drain plugs, manipulating valves, or by other methods. Drainage shall be in accordance with manufacturer's specifications.

**311.6 Pressure or vacuum gauge.** Gauges shall be provided for *public pools* in the *circulation system*. Gauges shall be provided with ready access.

1. A pressure gauge shall be located downstream of the pump and between the pump and *filter*.

TABLE 311.4  
CIRCULATION SYSTEM PIPE MATERIAL STANDARD

MATERIAL	STANDARD
Acrylonitrile butadiene styrene (ABS) plastic pipe	ASTM D 1527
Chlorinated polyvinyl chloride (CPVC) plastic pipe and tubing	ASTM D 2846; CSA B137.6
Copper or copper-alloy tubing	ASTM B 88; ASTM B 447
Polyvinyl chloride (PVC) hose	ASTM D 1785; ASTM D 2241; ASTM D 2672; CSA B137.3
Polyvinyl chloride (PVC) plastic pipe	ASTM D 1785; CSA B137.3
Stainless steel pipe, Types 304, 304L, 316, 316L	ASTM A 312

TABLE 311.4.1  
CIRCULATION SYSTEM FITTINGS

MATERIAL	STANDARD
Acrylonitrile butadiene styrene (ABS) plastic pipe	ASTM D 1527
Chlorinated polyvinyl chloride (CPVC) plastic pipe and tubing	ASTM D 2846; ASTM F 437; ASTM F 438; ASTM F 439; CSA B137.6
Copper or copper-alloy tubing	ASME B 16.15
Polyvinyl chloride (PVC) plastic pipe	ASTM D 2464; ASTM D 2466; ASTM D 2467; CSA B137.2; CSA B137.3
Stainless steel pipe, Types 304, 304L, 316, 316L	ASTM A 182; ASTM A 403



2. A vacuum gauge shall be located between the pump and *filter* and upstream of the pump.

**311.7 Flow measurement.** Public swimming pools and wading pools shall be equipped with a flow-measuring device that indicates the rate of flow through the *filter* system. The flow rate measuring device shall indicate gallons per minute and shall be selected and installed to be accurate within plus or minus 10 percent of actual flow.

**311.8 Instructions.** Written operation and maintenance instructions shall be provided for the *circulation system* of *public pools*.

**311.9 Hydrostatic pressure test.** Circulation system piping, other than that integrally included in the manufacture of the *aquatic vessel*, shall be subjected to a hydrostatic pressure test of 25 pounds per square inch (psi) (172.4 kPa). This pressure shall be held for not less than 15 minutes.

## SECTION 312 FILTERS

**312.1 General.** The provisions of this section apply to *filters* for all *aquatic vessels*.

**Exception:** *Portable residential spas* and *portable residential exercise spas*.

**312.2 Design.** *Filters* shall have a flow rating equal to or greater than the design flow rate of the system. *Filters* shall be installed in accordance with the manufacturer's instructions. *Filters* shall be designed so that *filtration* surfaces can be inspected and serviced.

**312.3 Internal pressure.** For pressure-type *filters*, a means shall be provided to permit the release of internal pressure.

**312.3.1 Air release.** *Filters* incorporating an automatic means of internal air release as the principal means of air release shall have one or more lids that provide a slow and safe release of pressure as a part of the design and shall have an manual air release in addition to an automatic release.

**312.3.2 Separation tanks.** A separation tank used in conjunction with a filter tank shall have a manual method of air release or a lid that provides for a slow and safe release of pressure as it is opened.

## SECTION 313 PUMPS AND MOTORS

**313.1 General.** The provisions of this section apply to pumps and motors for *aquatic vessels*.

**Exception:** *Portable residential spas* and *portable residential exercise spas*.

**313.2 Performance.** A pump shall be provided for circulation of the pool water. The pump shall be capable of providing the flow required for filtering the pool water and filter cleaning, if applicable, against the total dynamic head developed by the complete system.

**313.3 Intake protection.** A cleanable strainer, skimmer basket, or screen shall be provided for *aquatic vessels*, upstream

or as an integral part of circulation pumps, to remove solids, debris, hair, and lint on pressure filter systems.

**313.4 Location.** Pumps and motors shall be accessible for inspection and service in accordance with the manufacturer's specifications.

**313.5 Safety.** The design, construction, and installation of pumps and component parts shall be in accordance with the manufacturer's specifications.

**313.6 Isolation valves.** Shutoff valves shall be installed on the suction and discharge sides of pumps that are located below the *waterline*. Such valves shall be provided with access.

**313.7 Emergency shutoff switch.** An emergency shutoff switch shall be provided to disconnect all power to recirculation and jet system pumps and air blowers. Emergency shutoff switches shall be: provided with access; located within sight of the *aquatic vessel* and located not less than 5 feet (1524 mm) horizontally from the inside walls of the *aquatic vessel*.

**Exception:** Onground storable and permanent inground *residential swimming pools*.

**313.8 Motor performance.** Motors shall comply with UL 1004-1, UL 1081, CSA C22.2 No. 108 or the relevant motor requirements of UL 1563 or CSA C22.2 No. 218.1, as applicable.

## SECTION 314 RETURN AND SUCTION FITTINGS

**314.1 General.** The provisions of this section apply to return and suction fittings for aquatic vessels.

**Exception:** *Portable residential spas* and *portable residential exercise spas*.

**314.2 Entrapment avoidance.** Entrapment avoidance means shall be provided in accordance with Section 310.

**314.3. Flow distribution.** The *suction outlet fitting* assemblies, where installed, and the skimming systems shall each be designed to accommodate 100 percent of the circulation *turnover rate*.

**314.3.1 Multiple systems.** Where multiple systems are used in a single pool to meet this requirement, each subsystem shall proportionately be designed such that the maximum design flow rates cannot be exceeded during normal operation.

**314.4 Return inlets.** There shall be one *return inlet* for each 300 square feet (27.87 m<sup>2</sup>) of pool surface area, or fraction thereof.

**Exception:** *Onground storable pools*.

**314.4.1 Design.** Return and suction fittings for the *circulation system* shall be designed so as not to constitute a hazard to the bather.

**314.5 Vacuum fittings.** *Submerged vacuum fittings* shall be in accordance with Section 310.

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### SECTION 315 SKIMMERS

**315.1 General.** The provisions of this section apply to *skimmers* for *aquatic vessels*.

**Exception:** *Portable residential spas* and *portable residential exercise spas*.

**315.2 Required.** A *surface skimming system* shall be provided for public aquatic vessels. Either a *surface skimming system* or *perimeter overflow system* shall be provided for permanent inground *residential pools*. The *surface skimming system* shall be designed and constructed to skim the surface when the water level is maintained within the operational parameters.

**Exception:** *Class D public pools* designed in accordance with Chapter 6.

**315.2.1 Circulation systems.** Circulation systems shall be designed to process a minimum of 100 percent of the turnover rate through *skimmers*.

**315.3 Skimmer sizing.** Where automatic *surface skimmers* are used as the sole overflow system, at least one *surface skimmer* shall be provided for the square foot (square meter) areas, or fractions thereof, noted in Table 315.3. *Skimmers* shall be located to maintain effective skimming action.

TABLE 315.3  
SKIMMER SIZING TABLE

AQUATIC VESSEL	AREA PER SKIMMER (SQ. FT)
Public pool	400
Residential pool	800
Spas (all types)	150

For SI: 1 square foot = 0.09 m<sup>2</sup>.

**315.4 Perimeter coverage.** Where a perimeter-type *surface skimming system* is used as the sole surface skimming system, the system shall extend around not less than of 50 percent of the aquatic vessel perimeter.

**315.4.1 Surge capacity.** Where perimeter *surface skimming systems* are used, they shall be connected to a circulation system with a system surge capacity of not less than 1 gallon for each square foot (40.7 liters per square meter) of water surface. The capacity of the perimeter overflow system and related piping is permitted to be considered as a portion of the *surge capacity*.

**315.5 Equalizers.** Equalizers on *skimmers* shall be prohibited.

**315.6 Hazard.** Skimming devices shall be designed and installed so as not to create hazard to the user.

### SECTION 316 HEATERS

**316.1 General.** The provisions of this section apply to heaters for all *aquatic vessels*.

**Exception:** *Portable residential spas* and *portable residential exercise spas*.

**316.2 Listed and labeled.** Heaters shall be *listed* and *labeled* in accordance with the applicable standard listed in Table 316.2.

**316.3 Sizing.** Heaters shall be sized in accordance with the manufacturer's specifications.

**316.4 Installation.** Heaters shall be installed in accordance with the manufacturer's specifications and the *International Fuel Gas Code*, *International Mechanical Code*, *International Energy Conservation Code*, NFPA 70 or *International Residential Code*, as applicable in accordance with Section 102.7.1.

**316.4.1 Temperature.** A means shall be provided to monitor water temperature.

**316.4.2 Access prohibited.** For public *aquatic vessels*, public access to controls shall not be allowed.

**316.5 Heater circulation system.** Heater *circulation systems* shall comply with Sections 316.5.1 and 316.5.2.

**316.5.1 Water flow.** Water flow through the heater bypass piping, back-siphonage protection, and the use of heat sinks shall be in accordance with the heater manufacturer's specifications.

**316.5.2 Pump delay.** Where required by the manufacturer, heaters shall be installed with an automatic device that will ensure that the pump continues to run after the heater shuts off for the time period specified by the manufacturer.

### SECTION 317 AIR BLOWER AND AIR INDUCTION SYSTEM

**317.1 General.** This section applies to all devices and systems that induce or allow air to enter *aquatic vessels* either by means of a powered pump or passive design.

TABLE 316.2  
WATER HEATERS

DEVICE	STANDARD
Electric water heater	UL 1261, UL 1563 or CSA C22.2 No. 218.1
Gas-fired water heater	ANSI Z21.56a
Heat exchanger	NSF 50
Heat pump water heater	UL 1995, AHRI 1160, CSA C22.2 No. 236
Photovoltaic solar water heaters	NSF 50
Thermal radiant solar water heater	NSF 50

**317.2 Backflow prevention.** Air blower systems shall be equipped with backflow protection as specified in UL 1563 or CSA C22.2 No. 218.1.

**317.3 Air intake source.** Air intake sources shall not induce water, dirt or contaminants.

**317.4 Sizing.** *Air induction systems* shall be sized in accordance with the manufacturer's specifications.

**317.5 Inspection and service.** Air blowers shall be provided with access for inspection and service.

## SECTION 318 WATER SUPPLY

**318.1 Makeup water.** Makeup water to maintain the water level and water used as a vehicle for sanitizers or other chemicals, for pump priming, or for other such additions, shall be from a potable water source.

**318.2 Protection of potable water supply.** Potable water supply systems shall be designed, installed and maintained so as to prevent contamination from nonpotable liquids, solids or gases being introduced into the potable water supply through cross-connections or other piping connections to the system. Means of protection against backflow in the potable water supply shall be provided through an air gap complying with ASME A112.1.2 and the *International Residential Code* or the *International Plumbing Code*, as applicable in accordance with Section 102.7.1.

**318.3 Over-the-rim spouts.** Over-the-rim spouts shall be located under a *diving board*, adjacent to a *ladder*, or otherwise shielded so as not to create a hazard. The open end of such spouts shall not have sharp edges and shall not protrude more than 2 inches (51 mm) beyond the edge of the pool. The open end shall be separated from the water by an air gap of at least 1.5 pipe diameters measured from the pipe outlet to the rim.

## SECTION 319 SANITIZING EQUIPMENT

**319.1 Equipment standards.** Sanitizing equipment installed in public *aquatic vessels* shall be capable of introducing the quantity of sanitizer necessary to maintain the appropriate levels under all conditions of intended use.

**319.2 Chemical feeders.** Where installed, chemical feed systems shall be installed in accordance with the manufacturer's specifications. Chemical feed pumps shall be wired so that they cannot operate unless there is adequate return flow to disburse the chemical throughout the vessel as designed.

## SECTION 320 WASTE WATER DISPOSAL

**320.1 Backwash water or draining water.** Backwash water and draining water shall be discharged to the ~~sanitary~~ or storm sewer, or into an *approved* disposal system on the premise, or shall be disposed of by other means approved by

the state or local authority. Direct connections shall not be made between the end of the backwash line and the disposal system. Drains shall discharge through an air gap.

**320.2 Water salvage.** *Filter* backwash water shall not be returned to the vessel except where the backwash water has been filtered to remove particulates, treated to eliminate coli form bacteria and waterborne pathogens, and such return has been *approved* by the state or local authority.

**320.3 Waste post treatment.** Where necessary, *filter* backwash water and drainage water shall be treated chemically or through the use of settling tanks to eliminate or neutralize chemicals, diatomaceous earth, and contaminants in the water that exceed the limits set by the state or local effluent discharge requirements.

## SECTION 321 LIGHTING

**321.1 General.** The provisions of Sections 321.2 and 321.3 apply to lighting for public *aquatic vessels*. The provisions of Section 321.4 shall apply to *lighting* for *residential aquatic vessels*.

**321.2 Artificial lighting required.** When a pool is open during periods of low natural illumination, artificial lighting shall be provided so that all areas of the pool, including the bottom *main drains*, will be visible.

**321.2.1 Pool and deck illumination.** Overhead or underwater lighting shall be provided to illuminate the pool and adjacent deck areas. Such lighting shall be *listed, labeled* and installed in accordance with NFPA 70 or the *International Residential Code*, as applicable in accordance with Section 102.7.1.

**321.2.2 Illumination intensity.** For outdoor pools, the combination of overhead and underwater lighting shall provide not less than 3 foot-candles of illumination at the pool water surface. For indoor pools, the combination of overhead and underwater lighting shall provide not less than of 10 foot-candles at the pool water surface.

**321.2.3 Underwater lighting.** Underwater lighting shall provide a minimum of 8 lumens per square foot of pool water surface area.

**Exception:** Where overhead lighting provides not less than 15 foot-candles of illumination at the pool surface and all areas of the pool are visible without glare.

**321.3 Emergency illumination.** *Public pools* and pool areas that operate during periods of low illumination shall be provided with sufficient emergency lighting to permit evacuation of the pool and securing of the area in the event of power failure. The emergency lighting intensity shall be not less than 1 foot-candle at the water surface and the walking surface of the deck.

**321.4 Residential pool and deck illumination.** Where installed in *residential pools* and *permanent residential spas*, lighting shall be installed in accordance with NFPA 70 or the *International Residential Code*, as applicable in accordance with Section 102.7.1.

## SECTION 322 LADDERS AND RECESSED TREADS

**322.1 General.** *Ladders and recessed treads* shall comply with the provisions of this section and the applicable provisions of Chapters 4 through 10 based on the type of aquatic vessel.

**322.2 Outside diving envelope.** Where installed, steps and ladders shall be located outside of the minimum diving water envelope as indicated in Figure 322.2.

**322.3 Ladders.** *Ladder treads* shall have a uniform horizontal depth of not less than 2 inches (51 mm). There shall be a uniform distance between *ladder treads*, with a distance of not less than 7 inches (178 mm) and not greater than 12 inches (305 mm). The top tread of a *ladder* shall be located not greater than 12 inches (305 mm) below the top of the deck or coping. *Ladder treads* shall have *slip-resistant* surfaces.

**322.3.1 Wall clearance.** There shall be a clearance of not less than 3 inches (76 mm) and not greater than 6 inches (152 mm) between the pool wall and the *ladder*.

**322.3.2 Handrails and handholds.** *Ladders* shall be provided with two handholds or two *handrails*. The clear distance between *ladder handrails* shall be not less than 17 inches (432 mm) and not greater than 24 inches (610 mm).

**322.4 Recessed treads.** *Recessed treads* shall have minimum depth of not less than 5 inches (127 mm) and a width of not less than 12 inches (305 mm). The vertical distance between the pool coping edge, deck, or step surface and the uppermost *recessed tread* shall be not greater than 12 inches (305 mm). *Recessed treads* shall have *slip-resistant* surfaces.

**322.4.1 Vertical spacing.** *Recessed treads* at the centerline shall have a uniform vertical spacing of not less than 7 inches (178 mm) and not greater than 12 inches (305 mm).

**322.4.2 Drainage.** *Recessed treads* shall drain into the pool.

**322.4.3 Handrails and grab rails.** *Recessed treads* shall be provided with a *handrail* or grab rail on each side of the treads. The clear distance between *handrails* and grab rails shall be not less than 17 inches (432 mm) and not greater than 24 inches (610 mm).

## SECTION 323 SAFETY

**323.1 Handholds required.** Where the depth below the design waterline of an *aquatic vessel* exceeds 42 inches (1067 mm), handholds along the perimeter shall be provided. Handholds shall be located at the top of deck or coping.

### Exceptions:

1. Handholds shall not be required where an underwater bench, seat or swimout is installed.
2. Handholds shall not be required for wave action pools and action rivers.

**323.1.1 Height above water.** Handholds shall be located not more than 12 inches (305 mm) above the design waterline.

**323.1.2 Handhold type.** Handholds shall be one or more of the following:

1. Top of pool deck or coping.
2. Secured rope.
3. Rail.
4. Rock.
5. Ledge.
6. *Ladder*.
7. Stair step.
8. Any design that allows holding on with one hand while at the side of the pool.

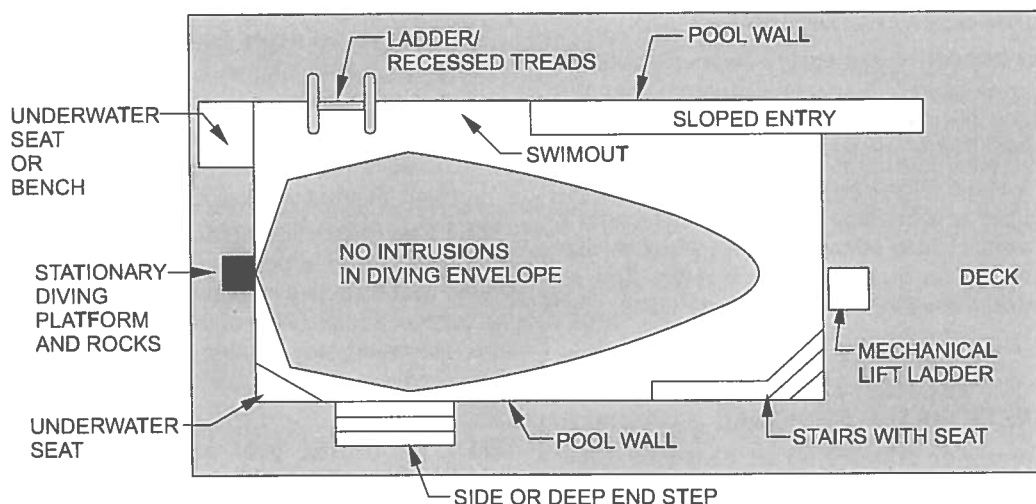


FIGURE 322.2  
MINIMUM WATER DIVING ENVELOPE

**323.1.3 Handhold spacing.** Handholds shall be horizontally spaced not greater than 4 feet (1219 mm) apart.

**323.2 Handrails.** Where *handrails* are installed, they shall conform to this section.

**323.2.1 Height.** Handrails shall be between 34 inches (864 mm) and 38 inches (965 mm) above the ramp or step surface as measured at the nosing of the step or finished surface of the slope.

**323.2.2 Material.** *Handrails* shall be made of corrosion-resistant materials.

**323.2.3 Nonremovable.** *Handrails* shall be installed so that they cannot be removed without the use of tools.

**323.2.4 Leading edge distance.** The leading edge of handrails for stairs, pool entries and exits shall be located not greater than 18 inches (457 mm) from the vertical face of the bottom riser.

**323.2.5 Diameter.** The outside diameter or width of *handrails* shall be not less than  $1\frac{1}{4}$  inches (32 mm) and not greater than 2 inches (51 mm).

**323.3 Obstructions and entrapment avoidance.** There shall not be obstructions that can cause the user to be entrapped or injured. Types of entrapment include, but are not limited to, wedge or pinch-type openings and rigid, nongiving cantilevered protrusions.

## CHAPTER 8

# PERMANENT INGROUND RESIDENTIAL SWIMMING POOLS

### SECTION 801 GENERAL

**801.1 Scope.** The provisions of this chapter shall govern permanent inground *residential swimming pools* that are installed for *residential* use. This chapter covers new construction, modification or *repair* and *residential aquatic vessels*.

**801.2 General.** Permanent inground *residential pools* shall also comply with the requirements of Chapter 3.

### SECTION 802 DESIGN

**802.1 Materials of components and accessories.** The materials of components and accessories used for permanent inground *residential swimming pools* shall be suitable for the environment in which they are installed. The materials shall be capable of fulfilling the design, installation and the intended use requirements in the *International Residential Code*.

**802.2 Structural design.** The structural design and materials shall be in accordance with the *International Residential Code*.

### SECTION 803 CONSTRUCTION TOLERANCES

**803.1 Construction tolerances.** The construction tolerance for dimensions for the overall length, width and depth of the pool shall be  $\pm 3$  inches (76 mm). The construction tolerance for all other dimensions shall be  $\pm 2$  inches (51 mm), unless otherwise specified by the design engineer.

### SECTION 804 DIVING WATER ENVELOPES

**804.1 General.** The minimum diving water envelopes shall be in accordance with Table 804.1 and Figure 804.1. Nega-

tive construction tolerances shall not be applied to the dimensions of the minimum diving water envelopes given in Table 804.1.

### SECTION 805 WALLS

**805.1 General.** Walls in the *shallow area* and *deep area* of the pool shall have a wall-to-floor transition point that is not less than 33 inches (838 mm) below the *design waterline*. Above the transition point, the walls shall be within 11 degrees (0.19 rad) of vertical.

### SECTION 806 OFFSET LEDGES

**806.1 Maximum width.** Offset ledges shall be not greater than 8 inches (203 mm) in width.

**806.2 Reduced width required.** Where an offset ledge is located less than 42 inches (1067 mm) below the *design waterline*, the width of such ledge shall be proportionately less than 8 inches (203 mm) in width so as to fall within 11 degrees of vertical as measured from the top of the design waterline.

### SECTION 807 POOL FLOORS

**807.1 Floor slopes.** Floor slopes shall be in accordance with Sections 807.1.1 through 807.1.3.

**807.1.1 Shallow end.** The slope of the floor from the beginning of the shallow end to the deep area floor slope transition point, indicated in Figure 804.1 as point E to point D, shall not exceed 1 unit vertical in 7 units horizontal.

**807.1.2 Shallow to deep transition.** The shallow to *deep area* floor slope transition point, indicated in Figure 804.1 as point D, shall occur at a depth not less than 33 inches

TABLE 804.1  
MINIMUM DIVING WATER ENVELOPE FOR SWIMMING POOLS DESIGNATED TYPES I-V<sup>b</sup>

POOL TYPE	MINIMUM DEPTHS AT POINT FEET-INCHES				MINIMUM WIDTHS AT POINT FEET-INCHES				MINIMUM LENGTHS BETWEEN POINTS FEET-INCHES					
	A	B	C	D	A	B	C	D	WA	AB	BC	CD	DE	WE
I	6-0	7-6	5-0	2-9	10-0	12-0	10-0	8-0	1-6	7-0	7-6	Note a	6-0	28-9
II	6-0	7-6	5-0	2-9	12-0	15-0	12-0	8-0	1-6	7-0	7-6	Note a	6-0	28-9
III	6-10	8-0	5-0	2-9	12-0	15-0	12-0	8-0	2-0	7-6	9-0	Note a	6-0	31-3
IV	7-8	8-0	5-0	2-9	15-0	18-0	15-0	9-0	2-6	8-0	10-6	Note a	6-0	31-3
V	8-6	9-0	5-0	2-9	15-0	18-0	15-0	9-0	3-0	9-0	12-0	Note a	6-0	36-9

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. The minimum length between points C and D varies based upon water depth at point D and the floor slope between points C and D.

b. See Figure 804.1 for location of points.

## PERMANENT INGROUND RESIDENTIAL SWIMMING POOLS

(838 mm) below the *design waterline* and at a point not less than 6 feet (1829 mm) from the beginning of the shallow end, indicated in Figure 804.1 as point E, except as specified in Section 809.7.

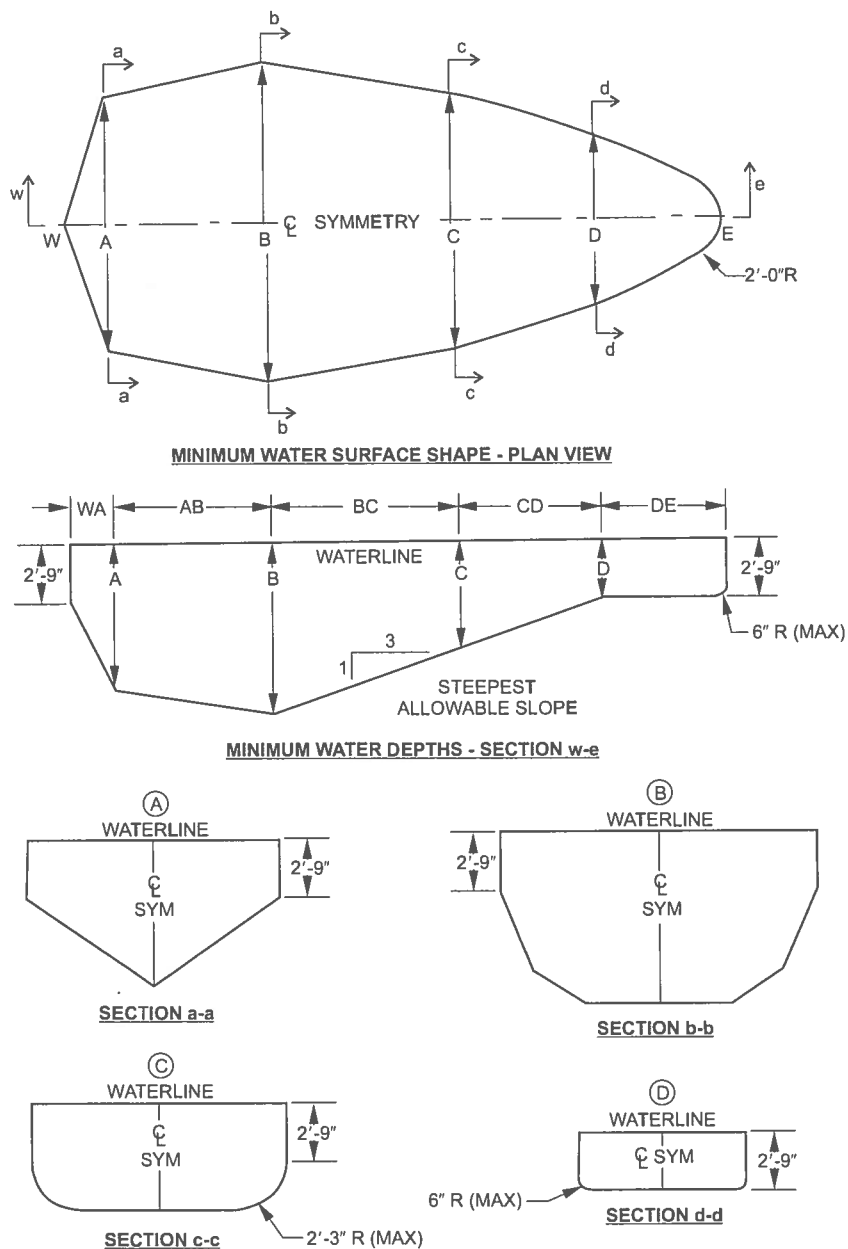
**807.1.3 Deep end.** The slope of the floor in the deep end, indicated in Figure 804.1 as point B to point D, shall not exceed a slope of 1 unit vertical in 3 units horizontal.

**807.2 Shallow end water depths.** The design water depth as measured at the shallowest point in the *shallow area* shall be not less than 33 inches (838 mm) and not greater than 4 feet (1219 mm). Shallow areas designed in accordance with Sec-

tions 809.6, 809.7 and 809.8 shall be exempt from the minimum depth requirement.

## SECTION 808 DIVING EQUIPMENT

**808.1 Manufactured and fabricated diving equipment.** Manufactured and fabricated diving equipment shall be in accordance with this section. Manufactured and fabricated diving equipment and appurtenances shall not be installed on a *Type O* pool.



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE 804.1  
MINIMUM WATER ENVELOPE

**808.2 Manufactured diving equipment.** Manufactured diving equipment shall be designed for swimming pool use.

**808.3 Installation.** Where manufactured diving equipment is installed, the installation shall be located in the *deep area* of the pool so as to provide the minimum dimensions as shown in Table 804.1 and shall be installed in accordance with the manufacturer's instructions.

**808.4 Labeling.** Manufactured diving equipment shall have a permanently affixed label indicating the manufacturer's name and address, the date of manufacture, the minimum diving envelope and the maximum weight limitation.

**808.5 Slip resistant.** Diving equipment shall have *slip-resistant* walking surfaces.

**808.6 Point A.** For the application of Table 804.1, Point A shall be the point from which all dimensions of width, length and depth are established for the minimum diving water envelope. If the tip of the diving board or diving platform is located at a distance of WA or greater from the deep end wall and the water depth at that location is equal to or greater than the water depth requirement at Point A, then the point on the water surface directly below the center of the tip of the *diving board* or *diving platform* shall be identified as Point A.

**808.7 Location of pool features in a diving pool.** Where a pool is designed for use with diving equipment, the location of steps, pool stairs, *ladders*, underwater benches, special features and other accessory items shall be outside of the minimum diving water envelope as indicated in Figure 322.2.

**808.8 Stationary diving platforms and diving rocks.** Stationary *diving platforms* and diving rocks built on-site shall be permitted to be flush with the wall and shall be located in the *diving area* of the pool. Point A shall be in front of the wall at the platform or diving rock centerline.

**808.9 Location.** The forward tip of manufactured or fabricated diving equipment shall be located directly above Point A as defined by Section 808.6.

**808.10 Elevation.** The maximum elevation of a *diving board* above the *design waterline* shall be in accordance with the manufacturer's instructions.

**808.11 Minimum water envelope.** Manufactured diving equipment installation and use instructions shall be provided by the diving equipment manufacturer and shall specify the minimum water dimensions required for each *diving board* and *diving stand* combination. The board manufacturer shall indicate the water envelope type by dimensionally relating their products to Point A on the water envelopes as shown in Figure 804.1 and Table 804.1. The board manufacturer shall specify which boards fit on the design pool geometry types as indicated in Table 804.1.

**808.12 Platform height above waterline.** The height of a stationary *diving platform* or a diving rock above the *design waterline* shall not exceed the dimensions in Table 808.12.

**808.13 Manufactured diving equipment height above waterline.** The diving equipment manufacturer shall specify the minimum headroom required above the board tip.

## SECTION 809 SPECIAL FEATURES

**809.1 Slides.** Slides shall be installed in accordance with the manufacturer's instructions.

**809.2 Entry and exit.** Pools shall have a means of entry and exit in the shallow area if the design water depth exceeds 24 inches (610 mm) at the shallowest point. Entries and exits shall consist of one or a combination of the following: steps, stairs, ladders, treads, ramps, beach entries, *underwater seats*, benches, *swimouts*, mechanical lifts and other approved designs. The means of entry and exit shall be located on the shallow side of the first slope change. Pools having more than one *shallow area*, including but not limited to center deep, play or sports pools, shall use the same type of entry and exit in all *shallow areas*. *Ladders* shall not be installed in a *shallow area* of a pool.

**809.3 Secondary entries and exits.** Where water depth in the *deep area* of a pool exceeds 5 feet (1524 mm), a means of entry and exit shall be provided in the *deep area* of the pool.

**809.4 Over 30 feet width.** Pools over 30 feet (9144 mm) in width at the *deep area* shall have an entry and exit on both sides of the *deep area* of the pool.

**809.5 Pool stairs.** The design and construction of stairs into the shallow end and recessed pool stairs shall conform to Sections 809.5.1 through 809.5.4.

**809.5.1 Tread dimension and area.** Treads shall have a minimum unobstructed horizontal depth of 10 inches (254 mm) and a minimum unobstructed surface area of 240 square inches (0.17 m<sup>2</sup>).

**809.5.2 Bottom riser.** On shallow end stairs, the bottom riser height is allowed to vary to the floor. The bottom riser must not exceed 12 inches (305 mm) to the floor for the width of the walking surface.

**809.5.3 Riser height.** Risers at the centerline shall have a uniform height not greater than 12 inches (305 mm), except the top riser, which shall be permitted to vary in height, but shall not exceed 12 inches (305 mm).

**809.5.4 Additional steps.** In design water depths exceeding 48 inches (1219 mm), no additional steps shall be required.

**809.6 Beach and sloping entries.** The slope of beach and sloping entries used as a pool entrance shall not exceed 1 unit vertical in 7 units horizontal.

TABLE 808.12  
DIVING PLATFORM OR APPURTENANCE  
HEIGHT ABOVE DESIGN WATERLINE

POOL TYPE	HEIGHT INCHES
I	42
II	42
III	50
IV	60
V	69

For SI: 1 inch = 25.4 mm.



## PERMANENT INGROUND RESIDENTIAL SWIMMING POOLS

**809.7 Steps and sloping entries.** Where steps and benches are used in conjunction with sloping entries, the vertical riser distance shall not exceed 12 inches (305 mm). For steps used in conjunction with sloping entries, the requirements of Section 809.6 shall apply.

**809.8 Architectural features.** Surfaces of architectural features shall not be required to comply with the 1 unit vertical in 7 units horizontal slope limitation.

**809.9 Maximum depth.** The horizontal surface of *underwater seats*, benches and *swimouts* shall not be greater than 20 inches (508 mm) below the design waterline.

### SECTION 810 CIRCULATION SYSTEMS

**810.1 Turnover rate.** The *circulation system* equipment shall be sized to provide a turnover of the pool water not less than once every 12 hours. The system shall be designed to provide the required *turnover rate* based on the manufacturer's specified maximum flow rate of the *filter*, with a clean media condition of the *filter*.

**810.2 Pressure test.** *Circulation system* piping, other than that integrally included in the manufacture of the pool, shall be subject to an induced static hydraulic pressure test (sealed system) at 25 pounds per square inch (psi) (172 kPa) for not less than 15 minutes.

**Exception:** *Onground storable pools and portable residential spas.*

**810.3 Strainer required.** Pressure filter systems shall be provided with a strainer located between the pool and the circulation pump.

### SECTION 811 SAFETY FEATURES

**811.1 Rope and float.** In pools where the point of first slope break occurs, a *rope and float* assembly shall be installed across the width of the pool. The rope assembly shall be located not less than 1 foot (305 mm) and not greater than 2 feet (610 mm) towards the shallow side of the slope break. Rope anchoring devices shall be permanently attached to the pool wall, coping or deck. Rope ends shall attach to the rope anchor devices so that the rope ends can be disconnected from the rope anchor device.

## CHAPTER 9

# PERMANENT RESIDENTIAL SPAS AND PERMANENT RESIDENTIAL EXERCISE SPAS

### SECTION 901 GENERAL

**901.1 Scope.** This chapter shall govern the design, installation, construction and *repair* of permanently installed *residential spas* and *exercise spas* intended for *residential* use.

**901.2 General.** *Permanent residential spas* and permanent *residential exercise spas* shall comply with Chapter 5 except that Sections 504.1, 504.1.1, 508.1 and 509 shall not apply. Such spas shall comply with the requirements of Chapter 3.

### SECTION 902 SAFETY FEATURES

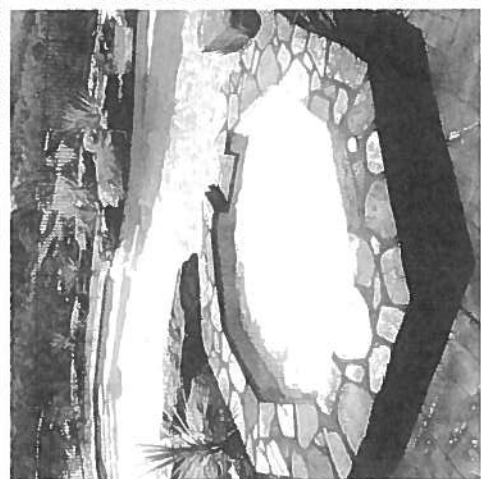
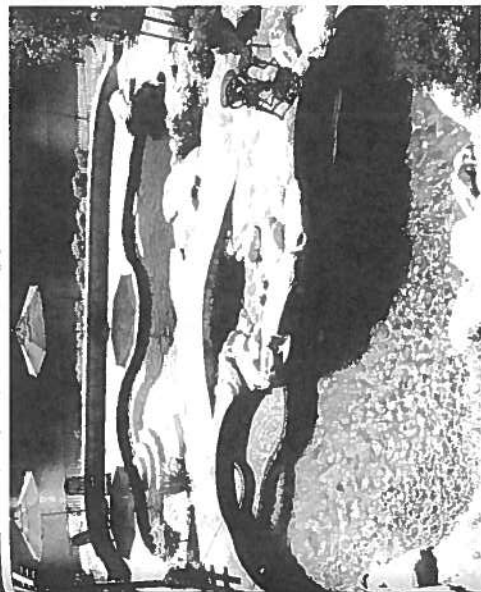
**902.1 Instructions and safety signs.** Instructions and safety signage shall comply with the manufacturer's recommendation and the requirements of the local jurisdiction.

ANSI/APSP-7 2006



APSP

*The Association of  
Pool & Spa Professionals™*



American National Standard

## ANSI/APSP-7 2006

### Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins

#### 1 Scope

**1.1 General.** This standard covers design and performance criteria for circulation systems including components, devices, and related technology installed to protect against entrapment hazards in residential and public swimming pools, wading pools, spas, hot tubs, and catch basins, hereinafter referred to as “pools and spas.”

This standard applies to new and, when retrofitting, existing installations. (See Appendix B.)

**1.2 Alternative methods.** The provisions of this standard are not intended to prevent the use of any alternative material, system, or method of construction, provided any such alternative meets the intent and requirements of this standard and is approved by the authority having jurisdiction.

**1.3 Exception.** Commercial water parks and their associated suction systems are outside the scope of the standard.

#### 2 Normative references

The following standards contain provisions that, through reference in this text, constitute provisions of this standard.

ANSI/ASME A112.19.8 1987 (reaffirmed 1996), *Suction fittings for swimming and wading pools, spas, hot tubs and whirlpool bathtub appliances.*<sup>1</sup>

<sup>1</sup> American Society of Mechanical Engineers (ASME), 3 Park Avenue, 20<sup>th</sup> Floor, New York, NY 10016, (212) 591-8562, [www.asme.org](http://www.asme.org)

ANSI/ASME A112.19.17-2002, *Manufactured safety vacuum release systems (SVRS) for residential and commercial swimming pool, spa, hot tub and wading pool suction systems.*<sup>2</sup>

ASTM F 2387-04, *Standard specification for manufactured safety vacuum release systems, swimming pools, spas and hot tubs.*<sup>3</sup>

IAPMO SPS-4 2000, *Special use suction fittings for swimming pools, spas and hot tubs (for suction side automatic swimming pool cleaners).*<sup>4</sup>

NFPA 70 – 2005, *National electrical code*, Article 680, Swimming pools, fountains, and similar installations.<sup>5</sup>

#### 3 Definitions

**3.1 alternative method:** A substitute way of achieving the same goal or purpose.

**3.2 anti-entrapment cover:** See LISTED SUCTION OUTLET COVER/GRATE.

**3.3 anti-vortex cover:** An outlet cover designed to prevent air entrainment from the surface of the water. This term is no longer used to describe LISTED SUCTION OUTLET COVER/GRATE.

**3.4 approved safety outlet cover:** See LISTED SUCTION OUTLET COVER/GRATE.

**3.5 branch piping:** 1. multiple suction outlet covers/grates: all pipe and fittings, including the tee, located between covers/grates and the single suction pipe feeding the pump or pumps. (See figure 1 and figures 4 – 10.) 2. sumps in series: all pipe and fittings between the first sump and a

<sup>2</sup> ASME, previously listed

<sup>3</sup> ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428, (610)832-9500, [www.astm.org](http://www.astm.org)

<sup>4</sup> International Association of Plumbing and Mechanical Officials (IAPMO), 5001 E. Philadelphia St., Ontario, CA 91761, (909) 472-4100, [www.iapmo.org](http://www.iapmo.org)

<sup>5</sup> National Fire Protection Association (NFPA) 1 Batterymarch Park, Quincy, MA 02169-7471, (617) 770-3000, [www.nfpa.org](http://www.nfpa.org)

required option of 5.9.1 through 5.9.3. (See figure 14.)

**3.6 catch basin:** A body of water supplied by gravity overflow from another pool. This is different from the terminology in storm water drainage.

**3.7 catch pool:** The pool at the discharge of a waterslide or similar aquatic facility.

**3.8 CAUTION:** Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

**3.9 certified safety outlet cover:** See LISTED SUCTION OUTLET COVER/GRATE.

**3.10 check valve:** A mechanical device in a pipe that permits the flow of water in one direction only.

**3.11 DANGER:** Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

**3.12 debris removal system:** A system comprised of a large opening suction outlet, large diameter pipe and a debris collection basket, typically located in the deck or the pump basket. Because of unique challenges passing debris through the drain cover and suction piping, these systems are designed specifically for debris removal and are commonly sold as kits with detailed installation requirements to address suction safety.

**3.13 drain:** an obsolete term for suction outlet, which is a fitting, fitting assembly, cover/grate, and related components that provide a localized low pressure area for the transfer of water from a swimming pool, wading pool, spa, or hot tub.

**3.14 drawdown:** Drawdown is the decrease of water level in a vented reservoir from the rest condition to operating condition.

**3.15 equalizer line:** 1. A pipe with a listed suction outlet cover/grate located below the waterline and connected to the body of a skimmer to prevent air from being drawn into the pump if the water level drops below the skimmer weir. 2. A

pipe connecting two bodies of water to equalize water levels.

**3.16 feet of head:** The resistance in a hydraulic system based on the equivalent to the height of a column of water that causes the same resistance (100 feet of head equals 43 pounds per square inch).

**3.17 flow rate:** The quantity of water flowing through a pipe within a specified time, such as the number of gallons flowing past a point in one minute; abbreviated as GPM or liters/minute, Lpm (1 GPM = 3.7854 L/min).

**3.18 flow rating:** The maximum allowable flow rate through a cover/grate.

**3.19 GPD, GPH, GPM:** Abbreviations for gallons per day, hour, and minute.

**3.20 gutter:** Overflow trough at the perimeter wall of a pool or at the bottom of a vanishing edge wall of a pool that is a component of the circulation system or flows to waste.

**3.21 hydrostatic valve:** A relief valve to allow rising groundwater to enter an empty pool to prevent flotation.

**3.22 inches of mercury (in Hg):** Traditional units of measuring pressure below atmospheric ("suction" or "vacuum") (1.0 inch Hg = 0.4912 psi). See psi.

**3.23 inlet:** See RETURN INLET.

**3.24 listed/listing:** The published certification by a nationally recognized testing laboratory that a device, system, or alternate method has been tested and certified to be in conformance with the full intent of a standard.

**3.25 listed safety cover:** See LISTED SUCTION OUTLET COVER/GRATE.

**3.26 listed suction outlet cover/grate – Manufactured:** A suction outlet cover/grate that has been tested, certified, and listed by a nationally recognized testing laboratory in accordance with the most recent edition of ANSI/ASME A112.19.8 *Suction fittings for swimming and wading pools, spas, hot tubs and whirlpool bathtub appliances.*

**3.27 listed SVRS:** A manufactured safety vacuum release system tested and certified by a nationally recognized testing laboratory in accordance with ANSI/ASME A112.19.17 or ASTM F 2387-04 cited in Normative References.

**3.28 main drain:** See DRAIN.

**3.29 manifold:** A branch pipe arrangement that connects several influent pipes into one chamber or pump or one chamber into several effluent pipes.

**3.30 maximum allowable flow rate:** See FLOW RATING, COVER/GRATE.

**3.31 maximum pump capacity:** The maximum flow capacity may be determined by one of the following methods:

- Simplified TDH Calculation (see definition); or
- The maximum flow possible by a pump(s) as indicated on the manufacturer's pump curve.

**Notice:** The flow condition of this method will likely be outside the pump's recommended operating range and shall be used only in the absence of a Simplified TDH Calculation.

**3.32 maximum system flow rate:** The flow resulting from the lowest possible total dynamic head (TDH) for a circulation system.

**3.33 operating point:** The condition at which the pump will operate. It is the intersection of the pump curve and system curve.

**3.34 overflow pipe:** See STANDPIPE.

**3.35 overflow system:** An outlet with flow across a fixed or movable weir and where there is a free surface interface with atmosphere.

**3.36 parallel:** A piping arrangement allowing flow through multiple paths.

**3.37 properly:** According to the manufacturers' instructions or to workmanlike practices as taught in vocational schools.

**3.38 psi:** An abbreviation for pounds per square inch.

**3.39 pump:** A mechanical device, usually powered by an electric motor, that causes hydraulic flow and pressure for the purpose of filtration, heating, and circulation of pool and spa water. Typically a centrifugal pump is used for pools, spas, and hot tubs.

**3.40 pump curve:** Also called the pump performance curve. A graph that represents the pressure rise of a pump plotted against flow rate. See SYSTEM CURVE AND OPERATING POINT.

**3.41 purpose:** Where used, the phrase "tested and listed for the purpose" shall require the device, system, or alternative method to be tested and certified by a nationally recognized testing laboratory, or a licensed professional engineer, as performing the required function(s) in accordance with the referenced standard.

**3.42 retrofit:** The act of adding a component or accessory to the pool and spa that was not part of the original installation — for example, replacing a non-listed suction outlet cover/grate with one that is listed. See also 6.2.

**3.43 return inlet:** The aperture or fitting through which the water under pressure returns into the pool or spa.

**3.44 safety drain cover:** See LISTED SUCTION OUTLET COVER/GRATE.

**3.45 safety vacuum release system (SVRS):** A system capable of providing vacuum release at a suction outlet in case of a high vacuum occurrence due to a suction outlet flow blockage. Methods may include, but are not necessarily limited to, venting the suction line to atmosphere and/or turning off the circulation pump, or reversing the circulation flow.

**3.46 simplified TDH calculation:** A method of determining the maximum system flow rate using hydraulic calculations based on the lowest possible total dynamic head (TDH) for a circulation system. For example, using the shortest distance between the pool and the pump, omitting the calculations

for fittings/valves, and using the best performance ratings for filters and heaters.

**3.47 single outlet, alternative suction systems:**

A single listed suction outlet cover/grate and an alternative suction system, including a venturi-driven system, turbine driven system, or any other mechanical means of circulating water without the use of a pump.

**3.48 skimmer:** A device installed in the wall of a body of water that permits the removal of floating debris and surface water.

**3.49 standpipe:** Vertical outlet pipe with open top end to control liquid level. OVERFLOW PIPE.

**3.50 suction outlet:** The term Suction Outlet shall indicate a fitting, fitting assembly, cover/grate, and related components that provide a localized low pressure area for the transfer of water from a swimming pool, wading pool, spa, or hot tub. See also LISTED SUCTION OUTLET COVER/GRATE.

**3.51 suction system piping:** All piping on the suction side of the system between the pool and the pump.

**3.52 sump:** The vessel between the suction outlet cover/grate and suction outlet piping. This may be manufactured or field built.

**3.53 sumps in series:** An arrangement of outlets such that effluent of one sump is influent to another sump. It is commonly used in piping submerged suction outlet(s) to skimmer body(s).

**3.54 surface crazing:** A network of fine cracks in the surface of a plastic part, such as a cover, grate, or ring.

**3.55 swim jet systems with hydrotherapy combination fitting:** Combination fitting or fittings that incorporate(s) a suction outlet and inlet designed to move a large volume of water at high velocity in a single direction.

**3.56 system curve:** A graph that shows the pressure difference required to induce flow through the entire piping system. It is plotted against flow rate.

**3.57 TDH:** See TOTAL DYNAMIC HEAD.

**3.58 tee:** A fitting in the shape of a "T" used to connect pipes. The "branch" is perpendicular to the two "run" connections.

**3.59 testing:** For the purposes of this standard "testing" shall mean the physical activity of performing an evaluation in accordance with the procedures and protocols defined by this standard and/or a referenced standard.

**3.60 total dynamic head (TDH):** The sum of all resistances in a complete operating system. See FEET OF HEAD.

**3.61 vacuum:** A condition in which the pressure inside an outlet or suction pipe is lower than atmospheric pressure.

**3.62 vanishing edge:** A design feature incorporated into a pool wall wherein the water flows over the wall (edge) into a catch gutter or catch pool creating the illusion that the water vanishes.

**3.63 vented reservoir:** A receptacle or container incorporated as part of a circulation system that is vented to atmosphere and receives water from the pool/spa or water feature by force of gravity, from which the pump draws its water supply. Systems including vented reservoirs are commonly referred to as gravity flow systems, gravity feed systems or gravity drainage systems. Vented reservoirs include but are not limited to the following: catch pools or catch basins, surge tanks, collector tanks, skimmers open to atmosphere, atmospheric vent pipe tees, gutters, overflow gutters, or perimeter gutter systems.

**3.64 wall vacuum fitting:** A fitting in the wall of a pool intended to provide a point of connection of suction for suction side cleaners.

**3.65 WARNING:** Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

**3.66 water velocity:** The speed at which water flows through a pipe, expressed in feet per second (meters per second).

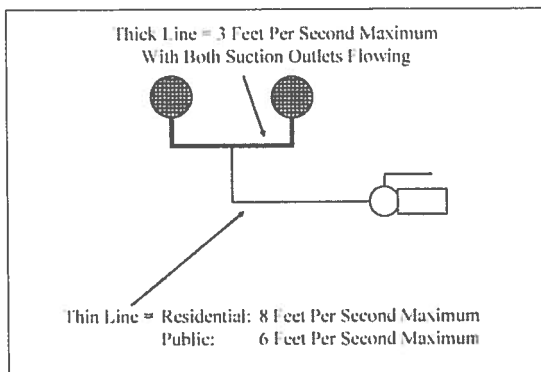
## 4 General requirements for suction entrapment avoidance systems and components

**4.1 Codes.** Pools and spas covered by this standard shall be constructed and operated to comply with all local, state, and federal codes governing safety and environmental regulations.

**4.2 Electrical components.** All associated electrical components installed in and/or adjacent to the circulation system shall comply with the requirements of the *National Electrical Code*, Article 680, Swimming pools, fountains, and similar installations, or the latest revision and any state or local codes.

**4.3 DANGER.** There is no backup for a missing or damaged suction outlet cover/grate. If any cover/grate is found to be damaged or missing, the pool or spa shall be immediately closed to bathers.

**4.4 Water velocity.** Water velocity in field-fabricated piping is based on the maximum system flow rate (see 4.4.1). Maximum water velocity in branch suction piping (shown as bold lines in figures 1 – 14) shall be limited to 6 feet per second (fps) (1.829 mps) when one of a pair is blocked. In normal operation then, the branch suction piping velocity is 3 feet per second (0.914 mps). All other suction piping velocities shall be 6 fps (1.829 mps) for public pools or 8 fps (2.438 mps) for residential pools (shown as thin lines in figures 1 through 14).



**Figure 1 – Pipe velocity**

NOTE – In figure 1, each separate line leading to the suction line should be sized to handle the pump's flow at 6 feet per second.

**4.4.1 Maximum system flow rate.** The maximum system flow rate shall be determined by one of the following:

- TDH calculation for the circulation system of each pump; or
- Simplified TDH calculation (see definition); or
- The maximum flow capacity of the new or replacement pump, which shall be limited by the criteria of 4.4.

**4.5 Listed suction outlet(s).** Suction outlet covers/grates shall be tested and listed by a nationally recognized testing laboratory as conforming to the most recent edition of ASME/ANSI A112.19.8 and include a permanently marked flow rating tested to prevent hair entrapment. They are not governed by the velocity limitations of 4.4 and 4.6.

**4.5.1 Field built sumps.** Field built sumps shall be built so that the opening of the suction pipe will be no closer than 1.5 times its inside diameter from the bottom of the listed suction outlet cover/grate.

**4.6 Minimum flow rating for each cover/grate.** When used, submerged suction outlet arrangements shall be single unblockable, dual, or three-or-more as defined below. All shall be in the same body of water for the purposes of 4.6.1 and 4.6.2.

**Table 1 – Flow rating for covers/grates**

Number of covers/grates per system	Minimum flow rating of each cover/grate % maximum system flow rate
1	100%
2	100%
3	66.7%
4	50%
5	40%
6	33.3%



**4.6.1 Single or dual outlets.** The flow rating for each listed cover/grate shall be greater than the maximum system flow as determined in accordance with 4.4.1.

**4.6.2 Three or more outlets.** For a system with three or more covers/grates, the sum of the flow ratings shall be at least twice the maximum system flow rate as determined in accordance with 4.4.1, or alternatively see table 1.

**Example:** Two (2) 100 GPM cover/grates and one (1) 60 GPM cover/grate would have an allowable maximum system flow rate of 130 GPM  $((100 + 100 + 60) / 2 = 130)$ .

**4.6.3 Warning:** When using table 1 with covers/grates of different flow ratings on the same system, the lowest flow rating shall be used in calculating.

**Example:** With two (2) cover/grates rated at 100 GPM, and one (1) rated at 80 GPM, the allowable maximum system flow rate is 120 GPM  $(80/.667 = 120)$ . (The higher rated cover/grates are not considered.)

**4.7 Dual cover/grate separation.** Two covers/grates shall be separated by a minimum of 3 feet (914 mm) measured from center to center of suction pipes, (see figures 4, 5, 6, 8, 9, and 10) or located on two (2) different planes; i.e., one (1) on the bottom and one (1) on the vertical wall, or one (1) each on two (2) separate vertical walls. (See figures 7 and 14.)

**4.8 Skimmers.** Skimmers shall be vented to atmosphere through openings in the lid, or through a separate vent pipe, designed in accordance with 7.2, or incorporate an equalizer line. (See figure 3.)

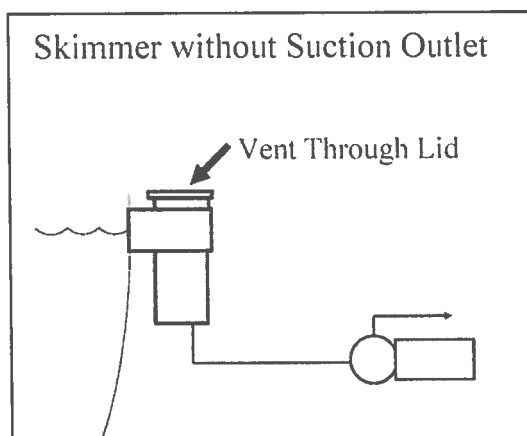


Figure 2 – Skimmer, vent through lid

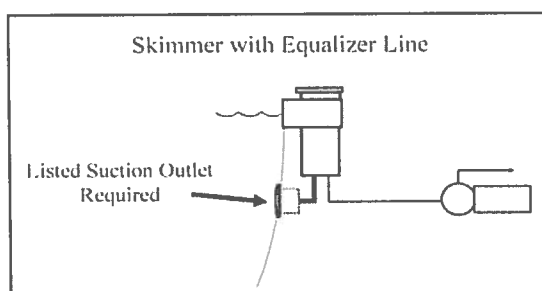


Figure 3 – Skimmer with equalizer

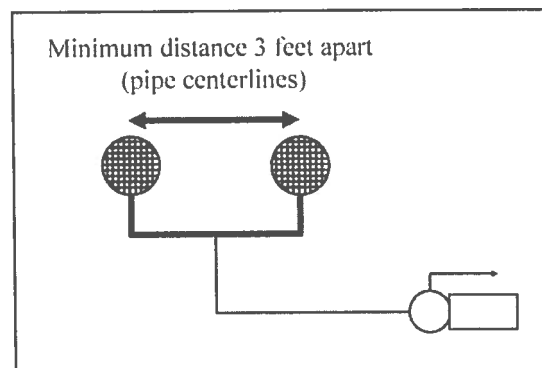


Figure 4 – Dual outlets in parallel to one pump

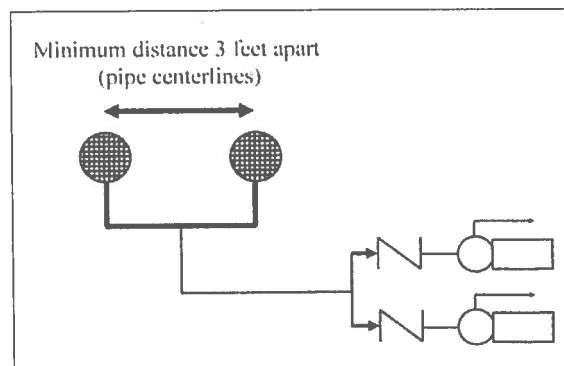


Figure 5 – Dual outlets in parallel to dual pumps in parallel

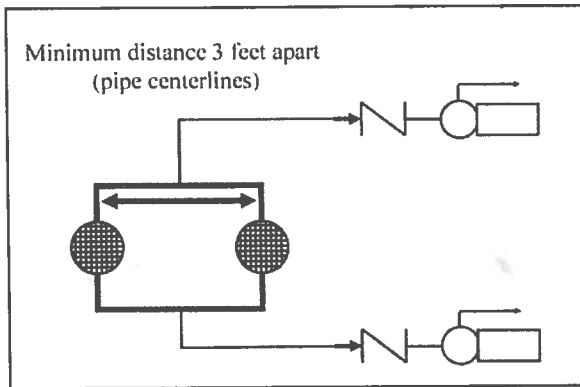


Figure 6 – Parallel dual outlets to two pumps

**4.8.1 Skimmer equalizer lines.** Skimmer equalizer lines, when used, shall be located on the wall with the center no more than 18 inches (457 mm) below the maximum operating level. It shall be protected by a listed suction outlet cover/grate with a flow rating equal to the maximum system flow divided by the number of skimmers when piped through a common suction line, or the maximum flow rating of the skimmer, whichever is greater. (See figure 3.)

**4.9 Wall vacuum fitting(s).** When used, vacuum cleaner fitting(s) shall be located in an accessible position(s) at least 6 inches (152 mm) and no greater than 18 inches (457 mm) below the water level and the self closing, self latching fitting shall comply with IAPMO SPS 4 – *Special use suction fitting for swimming pools, spas and hot tubs (for suction side automatic swimming pool cleaners)*. In addition, the vacuum piping shall be equipped with a valve to remain in the closed position when not in use.

## 5 New construction

**5.1 General.** Methods to avoid entrapment in circulation systems, swim jet systems, alternative suction systems, and debris removal systems are shown in 5.2 through 5.10.

**5.2 Submerged suction outlets are optional.** Fully submerged suction outlets (main drains) are not required in pools and spas. Surface skimming or overflow systems shall be permitted to provide 100 percent of the required system flow.

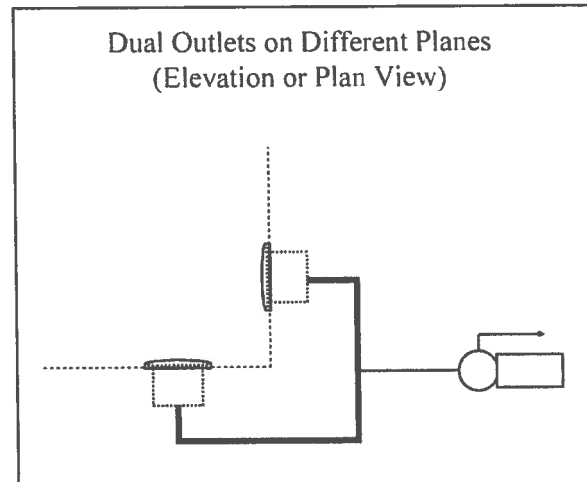


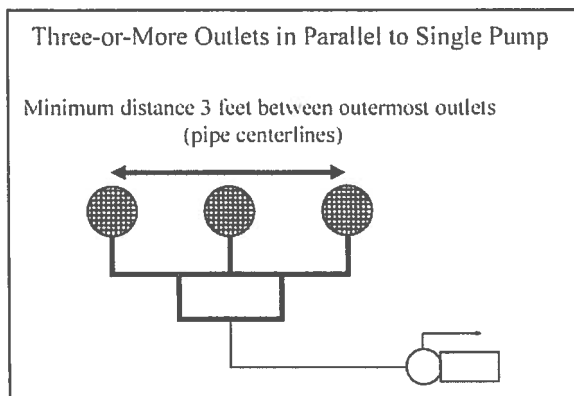
Figure 7 – Dual outlets on different planes

**5.3 Dual outlets.** Dual-outlets, i.e., two listed suction outlets, are piped to a single, common suction line to the pump(s). The tee feeding from the common line between the suction outlets, to the pump(s) shall be located approximately midway between the outlets with flow out of the branch of the tee. See figures 4, 5, 6, and 7.

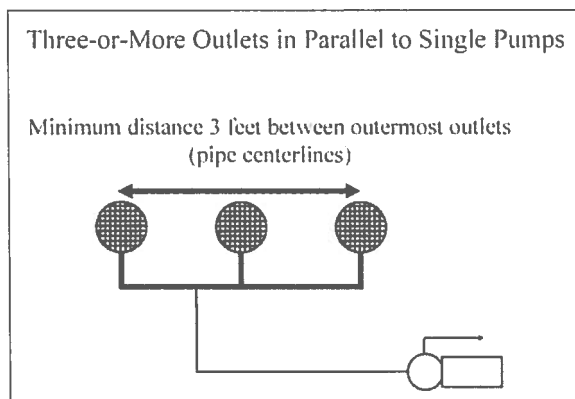
**5.3.1** The flow rating of each cover/grate shall be at least equal to the system's maximum flow rate.

**5.3.2 Dual outlet separation.** Dual outlets shall be separated by a minimum of 3 feet (914 mm) measured from center to center of the suction pipes (see figures 4, 5, and 6) or located on two (2) different planes, i.e., one (1) on the bottom and one (1) on the vertical wall, or one (1) each on two (2) separate vertical walls. (See figures 7 and 14.)

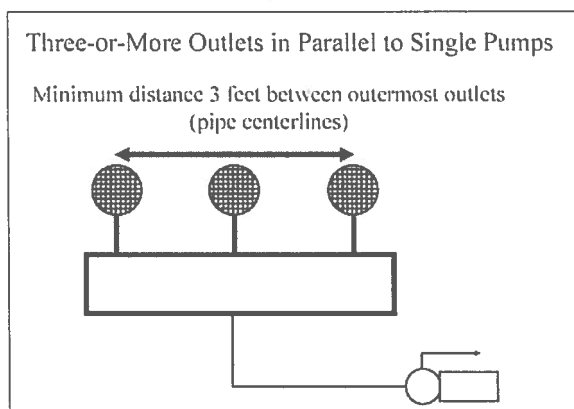
**5.4 Three-or-more outlets.** Three or more listed suction outlets are piped in parallel. Two of the outlets shall be piped with the tee feeding the suction line to the pump(s) located approximately midway between the two outlets. The additional outlet(s) shall be permitted when piped according to figures 8, 9, or 10.



**Figure 8 – Three or more outlets in parallel  
Symmetric piping**



**Figure 9 – Three or more outlets in parallel  
Eccentrically tapped piping**



**Figure 10 – Three or more outlets in parallel  
Looped piping**

**5.4.1** For three or more outlets, the sum of the ratings of the cover/grates shall be at least twice the maximum system flow rate.

**5.4.2** Three-or-more outlets are subject to the separation requirement only on the most widely spaced of the group. See figures 8, 9, or 10.

## **5.5 Single unblockable suction outlet**

**5.5.1 Single channel outlet.** A single listed channel outlet shall be considered acceptable if the size of the perforated area is 3 inches (76 mm) or greater in width and 31 inches (787 mm) or greater in length. (See figures 11 and 12.)

**5.5.2 Single unblockable outlet.** (See figure 13.) Single unblockable covers shall be of any size and shape such that a representation of the torso of the 99 percentile adult male cannot sufficiently block it to the extent that it creates a body suction entrapment hazard. The torso is represented as a rectangle 18 inches x 23 inches (457 mm x 584 mm) with corners of radius 4 inches (102 mm).

**5.6 Single outlet swim jet system.** Single outlet swim jet systems consist of a combination fitting that incorporates a suction outlet and inlet in a single housing that is designed to move a large volume of water at high velocity in a single direction. Such systems shall be tested and listed by a nationally recognized testing laboratory as conforming to the most recent edition of ASME/ANSI A112.19.8 and include a permanently marked Flow Rating tested to prevent hair entrapment. They are not governed by the velocity limitations of 4.4.

**5.7 Single outlet – alternative suction system.** Single outlet–alternative suction systems consist of a single listed suction outlet cover/grate utilizing a venturi-driven system for circulating water. Such systems shall be tested and listed by a nationally recognized testing laboratory as conforming to the most recent edition of ASME/ANSI A112.19.17 and ASTM F 2387-04.

**5.8 Gravity flow systems.** Flow from a pool or spa to a vented reservoir (see definition) may be partially or fully submerged.

**5.8.1** Pumps shall take suction from a vented reservoir rather than directly from the submerged suction outlets.

**5.8.2** The vent interface with atmosphere shall be designed or modified to inhibit blockage or infestation and shall be clearly identified to discourage tampering, unless the vented reservoir is an integral part of the swimming pool such as a gutter or catch pool.

**5.8.3** The vented reservoir shall be sized to accommodate pump start-up surge unless rated by the manufacturer.

**5.8.4** When a manufactured reservoir is used, the connection of submerged suction outlets to the vented reservoir shall be placed in accordance with manufacturer's instructions to limit the drawdown.

**5.8.5** Pipe shall be sized to provide the required flow at this drawdown.

**5.8.6 Fully submerged gravity outlet(s).** Fully submerged outlets in a gravity system shall be in accordance with 5.3, 5.4, or 5.5 and shall have a listed cover/grate(s) in accordance with 4.6.

**5.8.7 Partially submerged gravity outlet.** Partially submerged gravity outlets shall have a listed cover/grate in accordance with 4.6. **Exception:** Skimmers are not required to have a Listed cover/grate in accordance with 4.6.

**5.8.7.1 WARNING!**

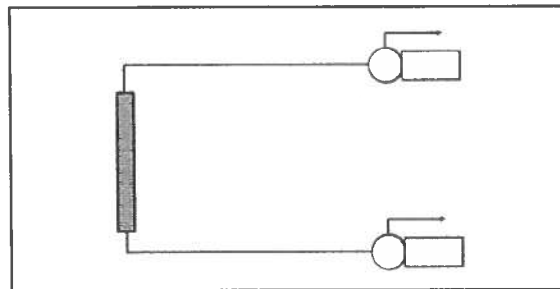
Unprotected overflow pipe (standpipe) outlets, another way to hold a minimum water level, pose a risk to bathers and shall not be used in pools and spas intended to be bather accessible.

**5.9 Outlet sumps in series.** Two manufactured sumps or field-fabricated sumps, with listed suction outlet covers/grates, piped in series, are typically intended for debris removal. Between the debris suction outlet and the pump, there shall be one of the options listed in 5.9.1., 5.9.2, or 5.9.3 (see figure 14). The manufacturer of such debris removal systems shall test and approve for the purpose at least one of these.

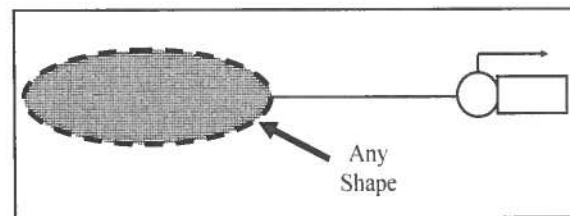
**5.9.1** One (1) additional suction outlet with listed suction outlet cover/grate located a



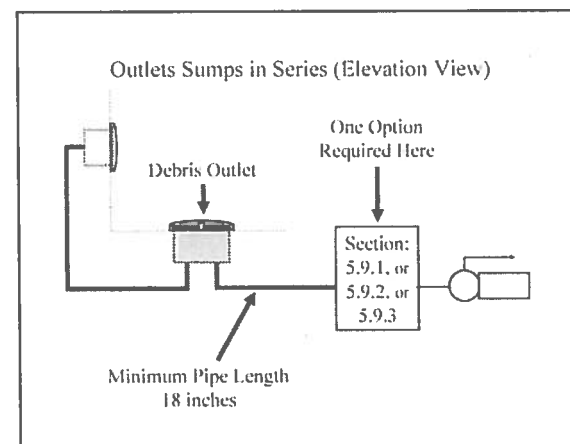
**Figure 11 – Single unblockable channel outlet to single pump**



**Figure 12 – Single unblockable channel outlet to two pumps**



**Figure 13 – Large unblockable outlet of any shape to single pump**



**Figure 14 – Sumps in series**

minimum of 18 inches (457 mm) from the tee in the suction line to the pump(s); or

**5.9.2** Engineered vent system in accordance with 7.2; or

**5.9.3** Listed manufactured SVRS in accordance with 7.1.

**5.10 Other means.** See 1.2.

## 6 Existing pools and spas

**DANGER!** To avoid serious injury or death, close the pool or spa to bathers if any suction outlet cover/grate is missing, broken, or inoperative.

**6.1 Periodic evaluation, testing, and maintenance.** Covers/grates and suction entrapment avoidance systems and related components shall be evaluated, maintained, and replaced by a person licensed or qualified in accordance with applicable manufacturer's instructions and local law.

**6.1.1 Maximum flow rate of an existing system.** To determine if system flow is compatible with the existing cover(s)/grate(s) flow rates, use one of the procedures of Appendix B, "Field checklist for identifying suction entrapment hazards."

**6.2 Retrofitting suction system piping or outlets.** When retrofitting, the retrofit installations shall be permitted to utilize a portion of the existing facility and add or replace other elements. The retrofit shall be in accordance with applicable sections of this standard.

**6.3 Existing installations - Single outlets.** When retrofitting existing installations with a single suction outlet that is not listed and approved for use as a single suction outlet, the existing suction outlet shall be retrofitted with either a listed single unblockable suction outlet or a listed suction outlet cover/grate and at least one of the following shall be added in accordance with 6.1.1.

- One or more additional listed suction outlet cover/grate located in accordance with 5.3; or
- Convert suction outlet to return inlet by changing the piping, provided the system piping and skimmer(s) shall be capable of handling the full system flow, in accordance with Section 5; or
- Gravity flow system in accordance with Section 5.8; or
- Engineered vent system in accordance with 7.2; or
- Listed manufactured SVRS in accordance with 7.1; or
- Permanently disable the single outlet, provided the system piping and skimmer(s) shall be capable of handling the circulation and distribution requirements.

**6.4 Existing skimmer equalizer lines.** Existing equalizer lines, when used, shall be retrofitted to comply with 4.8.1.

**6.5 Existing single outlet piped through skimmer.** A single suction outlet piped through a skimmer and deeper than 18 inches (457 mm) shall comply with 6.3.

**6.6 Existing installation - Two or more outlets.** When retrofitting existing installations with two or more suction outlets that are not listed, each shall be retrofitted with a listed cover/grate in accordance with 4.6 and Section 5.

## 7 Vacuum release systems

Vacuum release systems are methods, devices, and piping configurations that respond to a blockage of a single suction outlet by —

- releasing the vacuum by turning off the pump; or
- drawing water out of a vent tube to allow air into the suction system; or

- mechanically operating valves to reverse flow through the suction outlet(s); or
- opening a valve to atmosphere to cause the pump to lose prime.

**NOTE:** All vacuum release systems shall be tested on a single suction outlet with a listed safety cover in place. These devices/systems are not considered “backup” systems as there is no known suction vacuum release system that will completely protect against four of the five known hazards and presenting vacuum release systems as “backup” systems would promote a false sense of security among the users of these devices/systems.

**7.1 Listed manufactured SVRS.** Safety vacuum release systems, mechanical or electromechanical, venting or non-venting, shall be tested, certified, and listed for the purpose by a nationally recognized testing laboratory as conforming to ANSI/ASME A112.19.17 – Manufactured safety vacuum release systems (SVRS) for residential and commercial swimming pool, spa, hot tub and wading pool suction systems, or ASTM F 2387-04 *Standard specification for manufactured safety vacuum release systems (SVRS) for swimming pools, spas, and hot tubs*.

**NOTICE: Operating conditions.** Systems are tested for operation, in accordance with current standards, at room temperature. For substantially varying environmental conditions, including freezing, heat, salt spray, and humidity, confirm suitability with the SVRS manufacturer prior to installation and use.

**CAUTION: Incompatible configurations.** Some suction vacuum release systems may be incompatible with certain system configurations. The designer or installer shall confirm suitability with the SVRS manufacturer prior to installation and use. Incompatible configurations may include check valves, two or more suction outlets, hydrostatic relief valves, skimmers, solar systems, elevated or submerged pump suction, multilevel bodies of water, and water features.

**7.1.1 Check valves with listed manufactured suction vacuum release systems.** Installer shall refer to the manufacturers’ installation instructions.

ASME A112.19.17 does not allow use of SVRS in systems with any check valves or hydrostatic valves.

ASTM F 2387-04 allows check valves only under special conditions on the pressure side of the pump. See the standard for details.

## **7.2 Engineered vent systems**




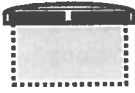
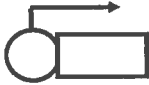



**7.2.1** Suction lines vented to the atmosphere shall be designed and certified by a licensed professional engineer whose specifications include but are not limited to maximum flow rates, pipe size(s), listed cover/grate make and model, depth of vent connection, and maximum equivalent distance from suction outlet to vent connection.

**7.2.2** Engineered vent systems shall be designed to perform such that when the suction outlet is completely blocked, the vacuum shall decay to the level present at the suction outlet prior to the suction outlet blockage within an elapsed time of 4.5 seconds.

**7.2.3** The vent line interface with atmosphere shall terminate with a fitting designed or modified to inhibit blockage or infestation and shall be clearly identified to discourage tampering.

## Appendix A – Symbols

## Symbols

<b>Bold Lines</b>	<b>Branch Piping</b> 3 fps Maximum With All Suction Outlets Flowing	<b>Thin Lines</b>	<b>Suction Line Piping</b> 8 fps residential 6 fps public
	<b>Outlet Cover/Grate</b>		<b>Outlet Cover/Grate with Sump</b>
	<b>Check Valve</b>		<b>Debris Outlet with Sump</b>
	<b>Pump</b>		<b>Channel Outlet</b>
	<b>Skimmer</b>		<b>Large Unblockable Outlet</b>

# Appendix B: Field Checklist for Identifying Suction Entrapment Hazards


This Appendix is not part of the American National Standard ANSI/APSP-7 2006 but is included for information only. Additional copies of the ANSI/APSP-7 standard and this Appendix can be purchased by contacting **APSP Member Services** at 703.838.0083, ext. 301.

## Introduction

This field checklist for identifying suction entrapment hazards provides information and a systematic process that will help identify and eliminate suction entrapment hazards in swimming pools, wading pools, spas, hot tubs, and catch basins. This information and system is intended to address the hazards of hair entrapment, limb entrapment, body suction entrapment, evisceration/disembowelment, and mechanical entrapment. It does not replace or supersede the information in the body of the

ANSI/APSP-7 standard. These guidelines are intended for use in inspecting, maintaining, and upgrading residential and public swimming pools, wading pools, spas, hot tubs, and catch basins. They are appropriate for use by service companies, builders, installers, facility owners/operators, home inspection specialists, parks and recreation personnel, and others who are responsible for pool and spa safety.

Reference numbers next to each block are used to facilitate telephone discussion. Mark the tracking boxes with an X to clearly document the current condition and actions needed and/or taken.

 **DANGER: To avoid serious injury or death, close the pool or spa to bathers if any suction outlet cover/grate is missing, broken or inoperative.**

Company \_\_\_\_\_

www. \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

Date \_\_\_\_\_ Phone \_\_\_\_\_

Inspected by \_\_\_\_\_

Pool \_\_\_\_\_

Pump System \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

Date \_\_\_\_\_ Phone \_\_\_\_\_

Owner/Operator \_\_\_\_\_

## EVALUATION / ACTIONS TAKEN

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Inspector _____ <small>(Print Name)</small>	Owner/Operator _____ <small>(Print Name)</small>
_____ <small>(Signature)</small>	_____ <small>(Signature)</small>
_____ <small>(Date)</small>	_____ <small>(Date)</small>

The provisions described herein are not intended to prevent the use of any alternative configuration or system, provided any such alternative meets the intent and requirements of these Guidelines.



**Start Here**  
Must End on **FINISH**

1

What is the Maximum System gpm of the single pump system?  
( ) gpm  
See Instructions on reverse page.

2

Are there multiple outlets? ☐ YES ☐ NO

3

Are all outlets certified in accordance with VGB 2008? ☐ YES ☐ NO

4

Does each dual outlet system have a cover with a flow rating equal to, or greater than, the Maximum System GPM?  
See Section 4.6\* ☐ YES ☐ NO

5

Have you recorded the end-of-life date for each cover, based on the installation date and marked life? ☐ YES ☐ NO

6

Is each cover within the VGB 2008 service life? ☐ YES ☐ NO

7

Is each cover undamaged? ☐ YES ☐ NO

8

Is each cover adequately secured to a sump/fitting/anchors for which the cover is certified in accordance with VGB 2008 or by a Registered Design Professional? ☐ YES ☐ NO

9

Is the sump a Field Fabricated Sump? ☐ YES ☐ NO

10

Is the Field Fabricated Sump compatible with the cover manufacturer's instructions, including, but not limited to:

1. Clearance between the pipe and underside of cover(s)
2. Clearance between edge of frame and the bottom of the sump?

☐ YES ☐ NO, or Unknown

11

Are there outlets?  
Fully submerged suction outlet(s) located in the floor, on the wall, or any skimmer equalizer fittings/lines. ☐ YES ☐ NO

12

How many pumps does the outlet (do the outlets) serve? ☐ ONE ☐ MULTIPLE

13

What is the Maximum Combined gpm of the multi-pump system?  
( ) + ( ) + ( ) = ( ) gpm  
NOTE: Include ALL pumps. See Instructions on reverse page.

14

Are all outlets unblockable, in accordance with ASME A112.19.8-2008a, per VGB 2008 requirements or certified by a Registered Design Professional (RDP)? ☐ YES ☐ NO

15

**WARNING!**  
*Suction Entrapment Hazard  
Non-compliant Outlet(s)*

16

**ACTION REQUIRED**  
This system requires VGB 2008-compliant suction outlet fittings. Unblockable outlets may be certified by a Registered Design Professional (RDP) as having covers/grates, sumps, and fastening systems in accordance with ASME A112.19.8-2007 Section 2.3.1.  
Manufactured product required to be tested and listed per VGB 2008 requirements.  
Each replacement cover must have a flow rating equal to or greater than the Maximum System GPM (See Section 4.6\*) or the Maximum System GPM may be permanently reduced below the cover flow rating by replacing pump or permanently restricting the pump discharge flow, provided the maximum turnover time is not exceeded.

17

Are there two or more outlets for each pump? ☐ YES ☐ NO

18

**WARNING!**  
Covers are not compatible with all sumps/fittings. Replace with compatible cover and/or create compliant sump per cover manufacturer's instructions.

19

\* Unless explicitly noted, all section numbers refer to ANSI/APSP-7 2006

Pump/System:

Date:

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Revised Date 06-09-09

**VACUUM FITTING**

20

Is there a dedicated vacuum cleaner fitting?
 

☐ NO  
☐ YES

Is there a fitting lid (cover) tested and listed by an Independent Testing Laboratory in accordance with IAPMO-SPS 4?
 

☐ YES  
☐ NO

Install or replace with fitting lid tested to IAPMO-SPS 4.
 

☐

**FINISH**

☐

Is the center-to-center distance between the covers at least 36 inches, or are the outlets on separate planes?
 

☐ YES  
☐ NO

Is the single outlet...
 

☐ YES  
☐ NO

A. an equalizer line piped through the second port of a skimmer?  
 B. unblockable?  
 C. a combination outlet/inlet incorporated into a single fitting?  
 D. a venturi-driven system?
 

☐ YES  
☐ NO

**WARNING! Suction Entrapment Hazard**  
*Choose at Least One Option*

Install VGB 2008 multiple outlets with adequate flow ratings, and with the center-to-center distance between the covers at least 36 inches, or with the outlets on separate planes. See Sections 4.5\* and 4.6\*/Appendix D.
 

☐

Convert single suction outlet to return inlet by changing the piping, provided that the system piping and skimmer(s) are capable of handling the full system flow.
 

☐

Convert to a gravity flow system in accordance with Section 5.8\*. Verify operation per Appendix D.
 

☐

Engineered vent systems in accordance with Section 7.2\*.
 

☐

Install and test per manufacturer's installation instructions, a manufactured safety vacuum release system (SVRS) tested and listed per VGB 2008 requirements in accordance with Section 7.1\*.
 

☐

Permanently disable the single outlet. Verify that the overflow and skimmers are capable of handling the required system flow and that minimum turnover rates are achieved.
 

☐

**Complete**

☐

**GO TO VACUUM FITTING**



The Association of  
Pool & Spa Professionals\*

JUNE, 2009

Is the center-to-center distance between the covers at least 36 inches, or are the outlets on separate planes?

- Is the single outlet...
- A. an equalizer line piped through the second port of a skimmer?
  - B. unblockable?
  - C. a combination outlet/inlet incorporated into a single fitting?
  - D. a venturi-driven system?

**WARNING! Suction Entrapment Hazard**  
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Install VGB 2008 multiple outlets with adequate flow ratings, and with the center-to-center distance between the covers at least 36 inches, or with the outlets on separate planes. See Sections 4.5\* and 4.6\*/Appendix D.

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**Complete** ☐ **GO TO VACUUM FITTING**